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MACK INDUSTRIES

VALLEY CITY, OHIO

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CONCRETE VERTICAL TUBE SEPARATOR (CVTS)

JOB NAME: CANTON DROP FORGE

JOB NUMBER: 78100

INSTALLATION DATE: 1-17-96

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

CONTENTS

Equipment Specifications

Application	Removal of free oil and settleable solids from oil/water mixture.
Drawing Number	OILSEP-125
Number of Units	One (1)
Outside Unit Dimensions	13'-0"L x 7'-0"W x 14'-0"H
Inside Unit Size	12'-0"L x 6'-0"W x 13'-0"H
Storage Inside Unit Size	12'-0"L x 3'-6"W x 5'-10"H
Construction	
Concrete Strength	5000 PSI Minimum
Concrete Type	III
Reinforcing Bar	Grade 60, ASTM A-615
Joints	Two (2) rows of conseal cs-440 oil resistant are to be used on all joints. All joints are to be grouted with non-shrink grout on the inside and the outside of the structure.
Design Parameters	
Uplift	The structure is designed for uplift, assuming that water table is at the top of structure.
Lateral Earth Pressure Assumptions	Saturated Unit Weight 115 pcf Angle of Internal Friction 30 Equivalent Fluid Pressure 65 pcf
Vehicle Loading	HS-20
Surcharge	80 psf Live Load Surcharge applicable depth of 8'.
Impact	30%
Installation	Flush with grade

Design Flow	125 GPM
Maximum Operating Capacity	698 Gallons
Oil Storage Capacity	1728 Gallons
Materials	All pipes and fittings shall be schedule 40 PVC. All tank flanged connections are 150# flat face flanges. Pump discharge piping, sch40, galvanized pipe.

Each unit shall conform to the following specifications:

Junction Box	Nema 4X
Level Switchs	5
Inlet Chamber	1'-0" long x 2'-0" wide, complete with inlet baffle and diffuser.
Coalescing/Separation Chamber	6'-6" long x 2'-0" wide, packed with vertically positioned matrix of perforated polypropylene oleophilic tubes, complete with sludge collection zone below tubes.
Oil Collection	6" Rotary Pipe Skimmer, manually operated complete with oil retention baffle.
Oil Sheen Baffle	1'-0" high x 2'-0" long, located before effluent weir wall.
Effluent Chamber	3'-6" long x 2'-0" wide chamber, complete with weir wall, adjustable weir plate arrangement which allows effluent discharge from the bottom of the chamber only.
Lifting Eyes	See Installation Instructions for equipment and preparation required.

Access Manways

Dosing Chamber	One (1) 36" x 48" aluminum hatch over dosing pumps
Separator	One (1) 12" dia casting over sludge pipe.
Oil Chamber	One (1) 18" dia casting
Manway Steps	Four (4)

Approximate weight of removable cover	30 lbs.
Oil Chamber Level Switch	One (1) Float Switch as manufactured by B & O 1900.
Dosing Chamber Level Switches	Four (4) Float switches as manufactured by B & O 1900.

All piping, electrical components, and appurtenances not specifically listed in the above specifications - **NOT BY MACK INDUSTRIES**

GENERAL ELECTRICAL SPECIFICATIONS

Type of Equipment	(2) Submersible Pumps (Barnes 3SE)
Type of Application	Effluent Pumping
MACK Drawing Number	OILSEP #78000
Sequence of Operation	Duplex - Auto alternation - Float switch controlled.

CONTRACTOR - PLEASE READ THIS

INSTRUCTION CAREFULLY

Mack Industries provides you with several valuable aids, and the few minutes you spend reading this instruction will save you hours later. The purpose of this instruction is to acquaint you with the equipment erecting knowledge which you now have at your fingertips.

THE INFORMATION CONTAINED IN THESE INSTRUCTIONS ARE BASED ON YEARS OF EXPERIENCE WITH THE ERECTION OF OUR EQUIPMENT, BUT ARE INTENDED AS A GUIDE ONLY. THE EQUIPMENT WHICH YOU HAVE AVAILABLE TO YOU MAY DICTATE OTHER, MORE CONVENIENT, PROCEDURES BUT THE FINAL RESPONSIBILITY FOR SELECTION OF ERECTION PROCEDURES OR TOOLS IS NOT BORNE BY MACK INDUSTRIES.

Installation Manual

This manual contains the heart of the information necessary to erect the equipment. It is structured as follows:

1. Title Page and General Instructions;
2. Table of Contents - listing of descriptions and reference numbers for all drawings
3. Specific Contract Information.

The complete section of information provided for each contract includes

1. Contract Equipment Specification - a written description of the equipment.
2. Installation Instructions - a general erection instruction for the equipment provided.

3. Assembly Drawings - showing the unit and its various components.

4. Operation and Maintenance Instructions.

General Instructions

RECEIVING MATERIAL

Upon receipt of a shipment, you should immediately check goods received. If you find that certain items are missing, make a note of this on the shipping papers to protect your interest. Also, IMMEDIATELY notify Mack Industries of this shortage.

All material has been thoroughly checked and inspected before shipment. If the equipment is received in bad condition or if the packages are broken, make a bad order notation on the shipping papers to this effect. THIS PROTECTS YOU since it will enable you to place the proper claims against the freight company. Notify proper authorities IMMEDIATELY if any parts are found broken or damaged during shipment.

Please handle the equipment properly when unloading and erecting. All cartons, electrical equipment, and gear drives, shipped separately or mounted on tank, should be stored under cover and protected from moisture, grit, and mud. Mack Industries will not be responsible for material deterioration due to improper handling, exposure, or inadequate protection during storage.

PROCEDURE FOR ORDERING SPARE OR REPAIR PARTS

CONTRACT # 7 0

1. Identify your equipment using the Mack Industries contract number shown on equipment specification sheets.

2. Identify the part by name and give the number of the drawing on which this part or assembly appears. If it is a part for a motor, pump, electrical control or any part not manufactured by Mack Industries, the information will be found in the manufacturer's reference data included in this brochure, or on the manufacturer's nameplate.

3. Show the part number. (Information can be gained in the same manner.)

4. Show the size, and include all pertinent dimensions (such as diameter, length, thickness, bore, pitch, etc.) whenever possible.

5. If parts being ordered are electrical in nature, give all pertinent data; voltage, amperage, wattage, cycle, speed power factor or other information given on a nameplate or in the brochure.

6. Submit you written purchase order or request for quotation, both signing and printing your full name so that we will know whom to contact should further clarification of the order be necessary. ALL VERBAL ORDERS MUST BE CONFIRMED IN WRITING.

7. Give return address, and shipping address.

8. Give preferred method of shipping: Parcel post, truck freight, rail freight, air express, etc.

9. Show quantity desired.

10. Give directions on where to send invoice.

11. ALL SPARE OR REPAIR PART ORDERS ARE SUBJECT TO A $100.00 MINIMUM ORDER CHARGE.

BACKCHARGES

MACK INDUSTRIES will not accept any charge for modification, servicing, adjustment or for any other item without written authority in the form of a PURCHASE ORDER issued from the home office at Valley City, Ohio IN ADVANCE of doing the work. This authority will only be given when satisfactory proof is submitted and the authority will only then be issued providing the price is agreed upon and the authority is given as outlined above BY OUR TECHNICAL SERVICE MANAGER.

ANY BACKCHARGE SUBMITTED CONTRARY TO THIS AGREEMENT WILL BE REJECTED IN TOTAL WITHOUT CONSIDERATION.

FURTHER ASSISTANCE

The erection aids material provided by Mack Industries should enable you to install, operate, and maintain the equipment. This instruction is provided to help you to help yourself, and therefore, to save you time and expense. If a problem is encountered in installing or operating the equipment which cannot be solved by referring to the available material, please feel free to contact us. Address your inquiry to our Technical Service Department, Mack Industries 201 Columbia Road, Valley City, Ohio 44280 or call us at 1-800-482-3111 or 1-216-483-3111.

WARNING

On desalting applications, do not allow emulsion layer or interface emulsion layer to enter oil / water separator stream. Either bypass the stream, or segregate stream interface. Emulsion layer will cause plugging of coalescing tubes and delta packs.

If an accidental spill occurs, remove coalescing tubes and delta packs and clean immediately.

De-emulsifier similar to ARCO 3037 may be used in cleaning operation.

Plastic Piping Handling, Storage, & Assembly

HANDLING AND STORING PLASTIC PIPE

Plastic pipe does not require "kid glove" treatment; however normal precautions should be taken to prevent excessive mechanical abuse. When unloading pipe from a truck for example, it is unwise to drag a length off the tailgate and allow the free end to crash to the ground. Remember too, that scratches and gouges on the pipe surface can lead to reduced pressure-carrying capacity. Standard pipe wrenches should not be used for making up threaded connections since they can deform or scar the pipe; use strap wrenches instead. When using a pipe vise or chuck, wrap jaws with emery cloth or soft metal.

Pipe should be stored on racks that afford continuous support and prevent sagging or draping of longer lengths. Burrs and sharp edges of metal racks should be avoided. Plastic fittings and flanges should be stored in separate bins of boxes and never mixed with metal piping components. The storage area should be clean and have adequate ventilation. Plastic pipe should not be stored or installed near a steam line or other source of heat that could overheat the pipe.

CUTTING PLASTIC PIPE

Plastic pipe can be cut easily with a power or hand hacksaw, circular or band saw. For best results, use fine-tooth blades with relatively little set. A circumferential speed of about 6,000 ft/min is suitable for circular saws; band saw speed should be approximately 3,000 ft/min. Carbide-tipped blades are preferable when large quantities of pipe are to be cut. Pipe and tube cutters are not recommended since they might cause excessive heat and pressure that can result in cracked or irregular ends. To ensure square-end cuts, a miter box, hold-down or jig should be used. All burrs should be removed with a fine-tooth file, deburring tool or sharp knife. Chips, burrs, filings, etc., should be removed from the pipe I.D. before installation.

BENDING PLASTIC PIPE

Bending leaves residual stresses in plastic pipe and consequently, use of bends is not recommended, particularly when the line is to operate at or near maximum rated pressures and

temperatures. Factory made fittings and straight lengths of pipe invariably give better performance. When field bending is necessary to meet special conditions or to provide for expansion and contraction of the pipe, the following technique should produce good results:

1. Seal both ends of the pipe length with plumber's test plugs and introduce sufficient air pressure to maintain ovalness of the pipe during bending. The same purpose can be achieved by filling the pipe with pre-heated sand.

2. Heat the pipe uniformly by immersing it in hot oil or water, or by rotating it in front of a hot-air gun. An open flame should not be used.

3. When the pipe becomes soft and pliable, it should be placed in a wooden forming jig or form, and the bend should be made as quickly as possible to prevent weakening or deforming the pipe. The minimum radius to which a bend should be made is 5 to 6 diameters, but the initial forming bend should be slightly greater to allow for spring-back.

4. The bend should be kept in the forming jig until the pipe cools and becomes rigid; then it should be cooled quickly by immersion in water. Air pressure should not be relieved or sand removed until after final cooling.

(Thermoset plastics such as glass-reinforced epoxy cannot be field bent by heating, of course.)

SOLVENT WELDING PLASTIC PIPING

The preferred method for joining rigid thermoplastics such as PVC and PVDC, solvent welding provides stronger and tighter joints than threading. Here are tips that should be useful.

1. Use the proper solvent cement: PVC cement with PVC pipe and PVDC cement with PVDC pipe.

2. When solvent welding PVC pipe, apply PVC cement liberally to the pipe O.D. and to the fitting I.D.

3. Leave a fillet bead between pipe and fitting when solvent welding PVC and PVDC piping, but remove excess cement from ABS and CAB.

4. Use a natural (hog) bristle brush for applying solvent cement; nylon and other synthetic materials are attacked by solvents in the cements.

5. Use a 1/2" wide brush for pipe 1/2" through 1"; a 1" brush for 1 1/4" through 2" pipe; and a 2" brush for pipe 3" and larger.

6. An ordinary oil can is an excellent container for acetone or cleaner. Excessive evaporation is prevented and the solvent is always handy.

7. Never allow water to come into contact with solvent cement. Wrap a handkerchief around your forehead in hot weather to keep perspiration from dripping into the cement. When not using cement keep covered.

8. Allow solvent cement to cure 5 to 15 minutes before handling and wait 24 hours before introducing full line pressure in a solvent cemented piping system.

9. At end of day, place brush in solvent and cover cement tightly. When re-using brush, shake excess solvent out before dipping it into cement.

SOLVENT CEMENT REQUIREMENTS

NOMINAL SIZE OF PIPE	AVG. NUMBER OF JOINTS PER QT.		NOMINAL SIZE OF PIPE	AVG. NUMBER OF JOINTS PER QT.
1/2"	700		2"	90
3/4"	400		3"	70
1"	300		4"	50
1 1/4"	220		6"	32
1 1/2"	160		8"	20

THREADED JOINTS

Take-down piping systems and temporary lines usually are installed with threaded connections. Threading reduces the effective wall thickness' of the pipe and results in lower pressure ratings. Threaded connections should be used only with Sch. 80 or heavier pipe.

"Tite-Joint" Thread Tape should be used for all threaded-connections since screwed fittings tend to bind after long periods of service. Wrap tape around male threads, overlapping about 1/4", until thread length is covered. "Teflon" base thread lubricant also can be used. It is inert and retains its lubricating qualities indefinitely, Squeeze a small amount on male pipe threads, spread with a brush and screw fitting onto pipe.

FLANGED JOINTS

One of the earliest methods for joining plastic pipes, flanging continues to be used extensively, especially for process lines that must be dismantled frequently. Plastic flanges and flanged fittings are available in a full size range and may be attached to pipe by solvent welding, threading or fusion welding.

Flanging is the preferred method of joining plastic-lined piping.

Soft rubber gaskets generally should be used between the flanges.

RECOMMENDED FLANGE BOLT TORQUE FOR PLASTIC FLANGES

FLANGE SIZE	BOLT DIAMETER	TORQUE FT-LB PSI*		FLANGE SIZE	BOLT DIAMETER	TORQUE FT-LB PSI*
1/2"	1/2"	10-15		2 1/2"	5/8"	20-30
3/4"	1/2"	10-15		3"	5/8"	20-30
1"	1/2"	10-15		4"	5/8"	20-30
1 1/4"	1/2"	10-15		6"	3/4"	33-50
1 1/2"	1/2"	10-15		8"	3/4"	33-50
2"	5/8"	20-30		10"	7/8"	53-75

To give bolt stress of 10,000 - 15,000 psi. Bolt torque refers to a well lubricated bolt.

Installation Instructions

GENERAL

The instructions outlined herein pertain to fabricated concrete oil water separators, flush and below grade installations.

NOTE:

The instructions outlined herein have been prepared to alert the contractor and maintenance personnel to procedures which require special attention during erection, operating and maintenance of units.

CAUTION: Any attempt to install, operate and maintain the units without following these instructions may result in damage, failure and improper operation of the units, and will be the sole responsibility of the contractor and/or owner.

It is most important that the site be properly prepared before the arrival of Mack Industries equipment.

BEDDING/BACKFILLING

1. The owner or his representative should consult a geotechnical engineer to verify that the soil has a minimum bearing capacity of 2000 psf. If the soil is not adequate, a special foundation design will be required. The contractor shall alert Mack Industries to this or any other unusual geotechnical requirements prior to production of the unit.

2. The contractor shall follow all county and/or OSHA safety rules in providing temporary shoring of the excavation.

3. The excavation shall be a minimum of 18" wider than the structure on all sides. The bottom of the excavation shall be filled with a minimum 6" thick stone bedding, or equivalent and properly graded to provide a level surface. The excavation shall be kept free of water until the structure is placed and backfilled.

4. Backfill shall be of a suitable compactible material as required by the project specifications. The backfill shall be free of large rocks, wood chunks or frozen lumps. Place the backfill in layers so that the difference in height of backfill is not more than two feet. Tamp each layer to achieve the same density as the surrounding earth using proper compacting techniques. **Use hand operated tampers or compactors - larger units could damage the structure.**

Do not cut holes or fasten equipment without contacting the factory.

When the above described installation procedures are completed, and tank accessories such as pumps, mixers, heater, etc., are installed and checked out, the equipment is ready for operation.

CAUTION: DO NOT START-UP SEPARATOR. SEE START-UP PROCEDURE BEFORE LETTING UNTREATED FLOW ENTER.

C. **Pipe Connections**

1. All flanged unit connections, unless otherwise noted, provided by Mack Industries are flat face design.

2. All piping running to and from Mack Industries units must be independently supported in order to eliminate strain and stress due to soil conditions or due to pipe contractions and expansions.

3. For plain end connections, use the customer specified attachment.

INSTALLATION

1. Upon arrival, check the separator for any visible damage. Report any damage to the driver. Also see General Instructions for additional information.

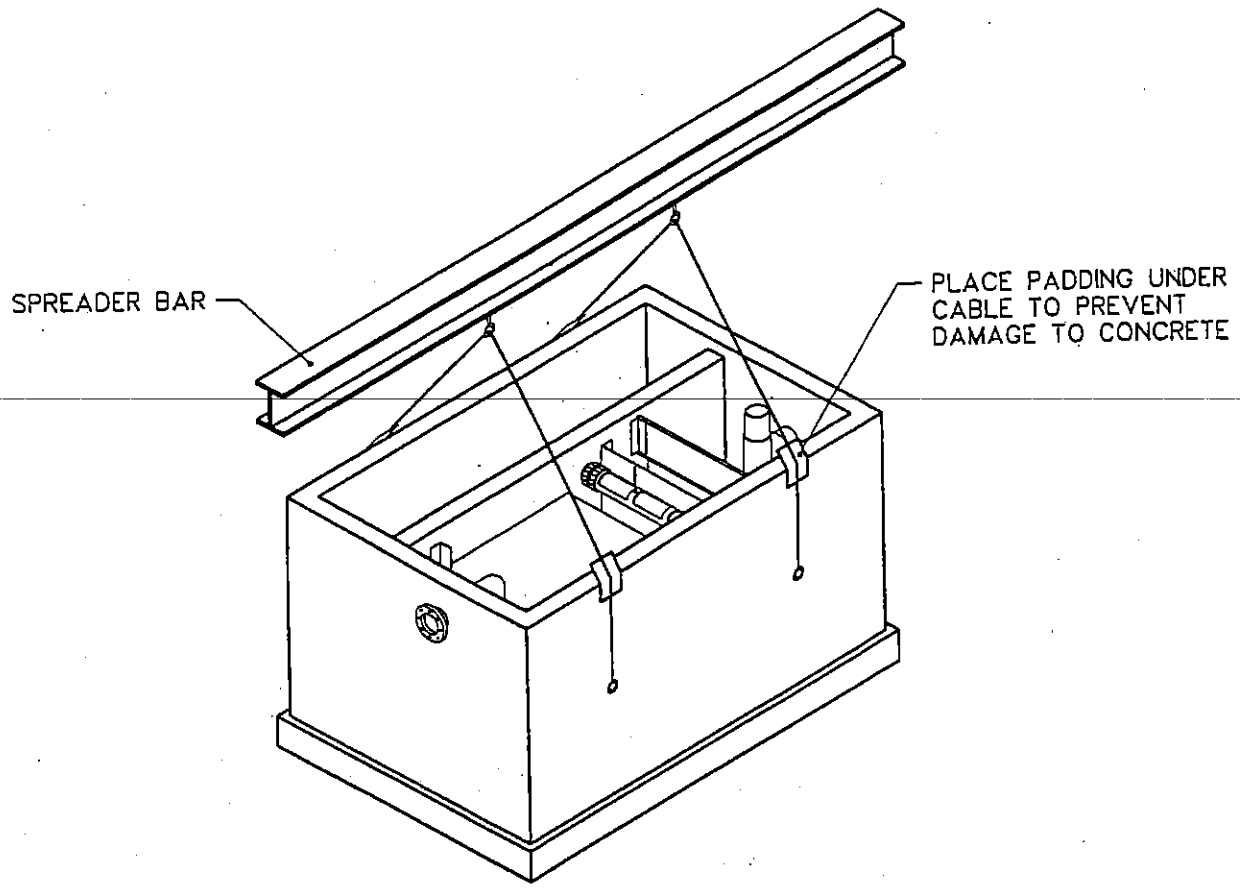
2. Lift separator from trailer with crane by connecting chains or cables to the lifting straps provided with the separator. See drawings and specifications in this brochure for number of straps provided/required.

WARNING: IF LIFTING LUGS ARE PROVIDED, USE SPREADER BARS TO ELIMINATE ANY SIDE FORCES ON LIFTING LUGS. FORCE ON LUGS

MUST BE APPLIED IN VERTICAL DIRECTION ONLY. ANY SIDE FORCE ON LIFTING LUGS MIGHT DAMAGE TANK CONSTRUCTION. SEE FIG 3.0 FOR PROPER CABLE/HOOK ATTACHMENT TO LIFTING LUGS.

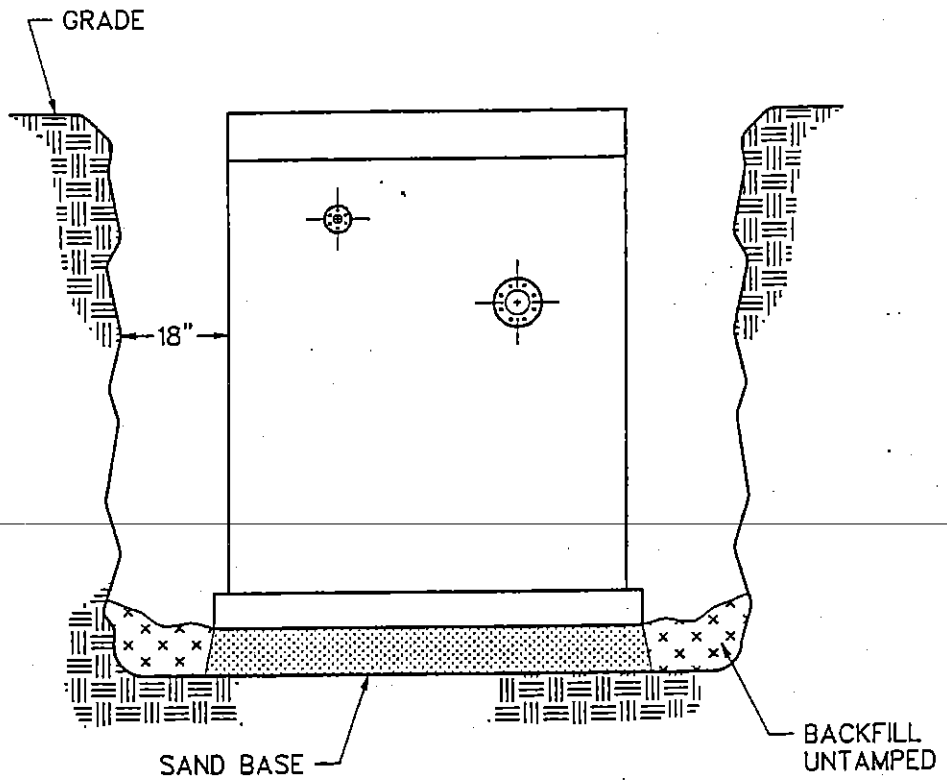
3. Set separator in place, See Fig. 1.0, 2.0, and 3.0.

TYPICAL LIFTING ARRANGEMENT



Mack Industries will supply the best lifting arrangement for each seperator application.

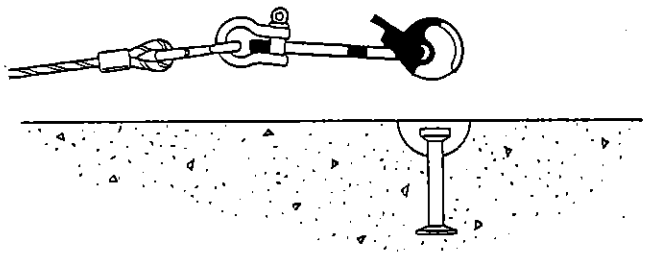
Figure 1.0



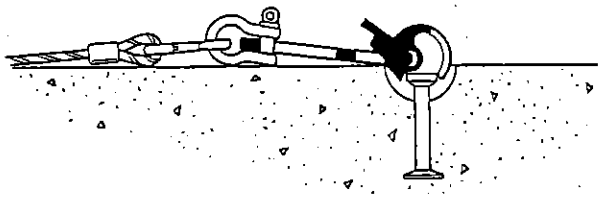
Flush with Grade Installation

Figure 2.0

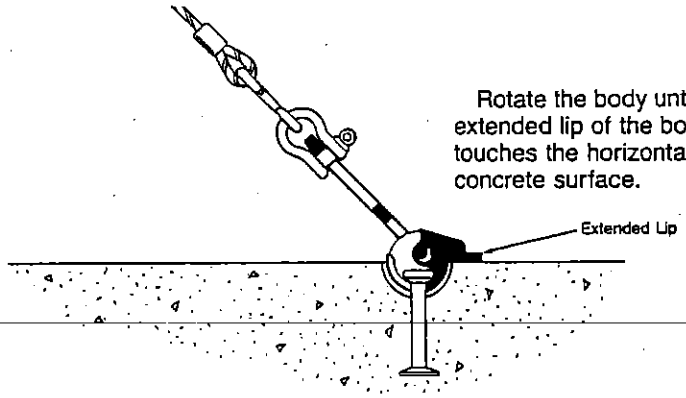
How to Use the SL Universal Lifting Eye



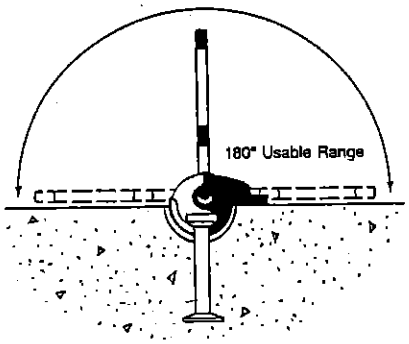
To install the P-50 Universal Lifting Eye, hold the unit upside down with the T-shaped slot of the body directly over the head of the swift lift anchor.



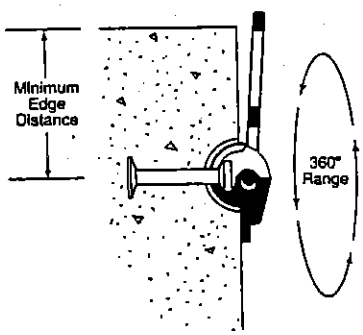
Lower the body of the lifting eye until the T-shaped slot engages the head of the anchor.



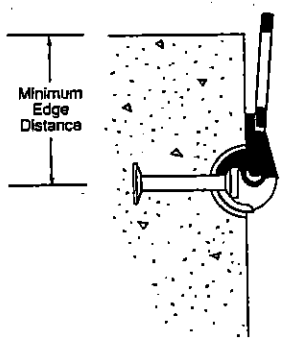
Rotate the body until the extended lip of the body touches the horizontal concrete surface.



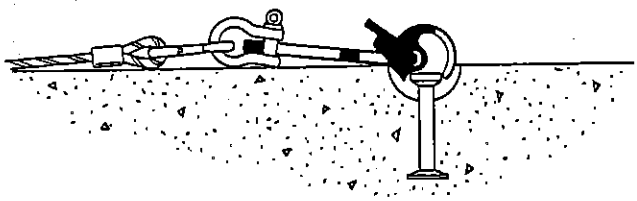
Note that the bail can move throughout a 180° usable range.



Note that the main body of the lifting eye has a 360° rotational range. This feature in combination with the 180° bail movement offers the user unlimited angular crane line loads.



The lifting eye may be safely used with the T-shaped slot facing away from or towards the direction of applied load.



To disengage the lifting eye, the crane hook is lowered and the body removed by rotating the extended lip upward.

Figure 3.0 CDF005753

LEVELING TANKS

Before piping connections are performed, the tanks must be properly leveled. The allowable deviations shall be

1. Side to Side (Tank width): 1/4"
2. End of End (Tank length): 1/4"

If the tank is equipped with skimmer or other specified equipment, remove shipping braces and tape, and refer to specific instruction in this brochure for installation and adjustment required.

LEVELING WEIR PLATES

Loosen nuts on effluent and oil trough weir plates.

If blind flanges are available, use them on all tank nozzles located below tank water level. If connecting piping to all tank nozzles is supplied with shut-off valves that can isolate the tank, connect piping and close valves.

Fill tank with water. Make sure all tank chambers are filled evenly. Do not exceed tank design flow (see equipment specifications in this brochure when filling tank).

Inspect all weir plates and skimmers, check weir plate levels using water level as reference, adjust as required. Tighten weir plate bolts. Do not overtighten.

Connect all piping if not previously done, see instructions above and check for leaks.

When the above described installation procedures are completed, and tank, accessories, such as pumps, mixers, heaters etc., are installed and checked out, the equipment is ready for operation.

CAUTION: DO NOT START-UP SEPARATOR - SEE START-UP PROCEDURE BEFORE LETTING UNTREATED FLOW ENTER.

Start-Up Procedure

General

Instructions contained herein are of utmost importance to proper operation of all CVTS separators.

Warning

Failure to follow the described procedure may result in improper separator performance, poor effluent quality and the posibility of tube plugging on concrete vertical tube models (CVTS).

Start Up

After the separator installation is completed and all of the piping and pumps are connected and; before the waste stream to be separated is allowed to enter the separator, ALL OF THE SEPARATOR CHAMBERS INCLUDING THE EFFLUENT CHAMBER MUST BE FILLED (PRIMED) WITH CLEAN WATER. The clean water may be introduced through manways until the water level reaches the top of the effluent weir.

WAS THIS DONE

Caution

Do not fill the oil troughs or the oil starage (slop) tanks.

After the separator is primed, the waste stream may be introduced into the inlet chamber through the inlet connection.

NOTE: The above described separator priming procedure must always be used in cases where the separator has been drained for cleaning, maintenance, or repairs.

Operation Principle

BASIC OPERATING PRINCIPLE

In a nearly motionless state, free oil and water separate because of the natural effects of gravity. Water, being heavier, will settle, and oil, being lighter, will rise. Solids, depending on their density and velocity, will also settle out due to gravity. Mack Industries gravity separators utilize this natural process in a carefully engineered structure. The separators provide a volume through which polluted water and solids flow. The oil accumulates on the top and can be skimmed off, the settleable solids collect on the floor for periodic removal, and the water passes through and is discharged. See assembly drawing in this brochure provided on the unit. The gravity separator model which your company has purchased is a CONCRETE VERTICAL TUBE Separator (CVTS). The following is a description of the various CVTS components and how they function in the system. See Fig. 1.0 for typical flow pattern and components.

INLET CHAMBER

The basic purpose of the inlet chamber is to remove gross solids and trash from the influent stream and to distribute the flow evenly throughout the separating chambers.

INLET PIPE

The inlet pipe(s) provided with elbows, direct the flow towards the separator bottom in order to reduce channeling and turbulence in the separating chamber. No flow control device is provided. As a result, care must be taken to insure that a flow rate greater than the designed flow rate is not fed to the unit. If larger than designed flow rates are permitted to enter the CVTS, less time is available to separate the oil and water. The result can be a poor quality effluent.

INLET SLUDGE/DIFFUSION BAFFLE

The inlet sludge/diffusion baffle separates the inlet, and sludge chambers, and redirects the flow to the middle of the vertical coalescing tubes, thereby, forcing the solids to accumulate on the floor. The gross solids accumulated are removed through a sludge draw-off, optional pipe, or by dropping a pump suction hose through a manway.

SEPARATING CHAMBER

The separating chamber is essentially an area where polluted water stands nearly motionless for a period of time so gravity separation of oil, water and solids can occur. In the CVTS, this chamber is filled with oleophilic, oil attracting tubes. These MACK designed tubes distribute the flow throughout the entire width and depth of the chamber and greatly reduce the turbulence, thereby, enhancing oil and water separation. The coalescing action of the tubes provides additional assistance in separating oil and water. Small oil globules are attracted to the tubes, combine with other globules, and then float through the tubes to the water surface.

SLUDGE CHAMBER

The sludge chamber is designed to contain settleable solids which have collected on the separator floor and prevent them from passing under the oil retention baffle and out of the CVTS. The sludge will build up on the floor of the chamber and can be removed through a sludge drawoff system installed by Mack Industries or by pumping the water out of the CVTS and scraping the sludge from the floor.

NOTE: A LARGE ACCUMULATION OF SLUDGE IS DETRIMENTAL TO THE OPERATION OF THE CVTS SINCE IT REDUCES THE WATER VOLUME AVAILABLE IN THE SEPARATING CHAMBER. THIS REDUCTION IN VOLUME RESULTS IN AN INCREASED FLOW RATE THROUGH THE

CHAMBER WHICH DECREASES THE AMOUNT OF TIME AVAILABLE TO SEPARATE THE OIL, WATER AND SETTLEABLE SOLIDS. THE END RESULT CAN BE A POOR QUALITY EFFLUENT. THEREFORE, THE SEPARATING CHAMBER SHOULD BE CHECKED PERIODICALLY FOR SLUDGE BUILDUP AND THE SLUDGE REMOVED AS NECESSARY.

ROTARY PIPE SKIMMER

If the unit is provided with a rotary pipe skimmer, see separate instruction manual contained in this bochure.

SHEEN BAFFLE

The sheen baffle is designed to capture small oil droplets that might pass under the oil retention baffle.

The buildup of oil at the baffle is so slow that no skimming device is required.

WEIR WALL AND PLATE

The static water level, which occurs when there is no water flowing through the separator, is determined by the weir wall. This level can be adjusted by raising the effluent weir plate. Once the elevation is established, the flow through the separator may be very closely established by measuring, in inches, the differential between the water level and top of the weir plate or the "head", see Fig. 4.0. Once the "head" is established the flows through the unit can be calculated by using the Nomograph on the following page.

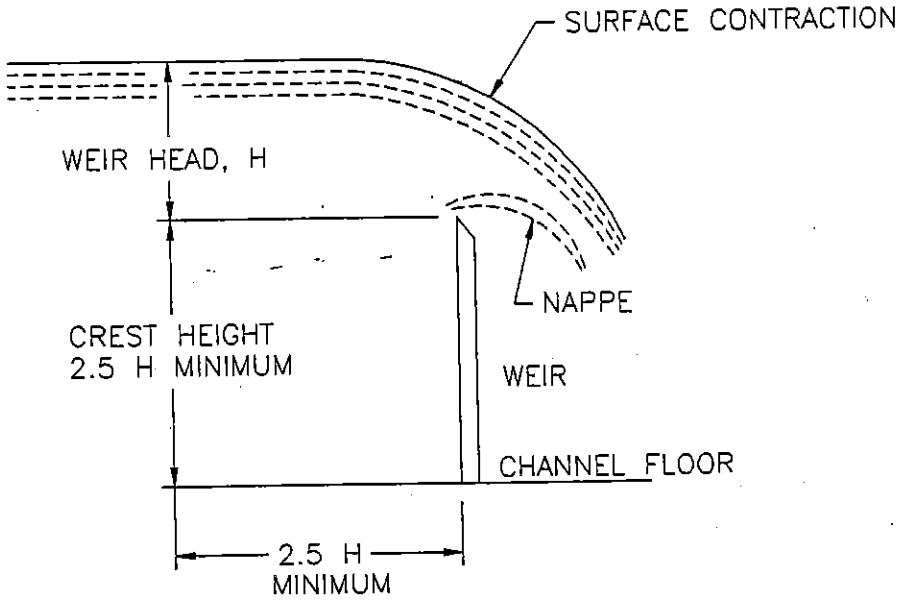
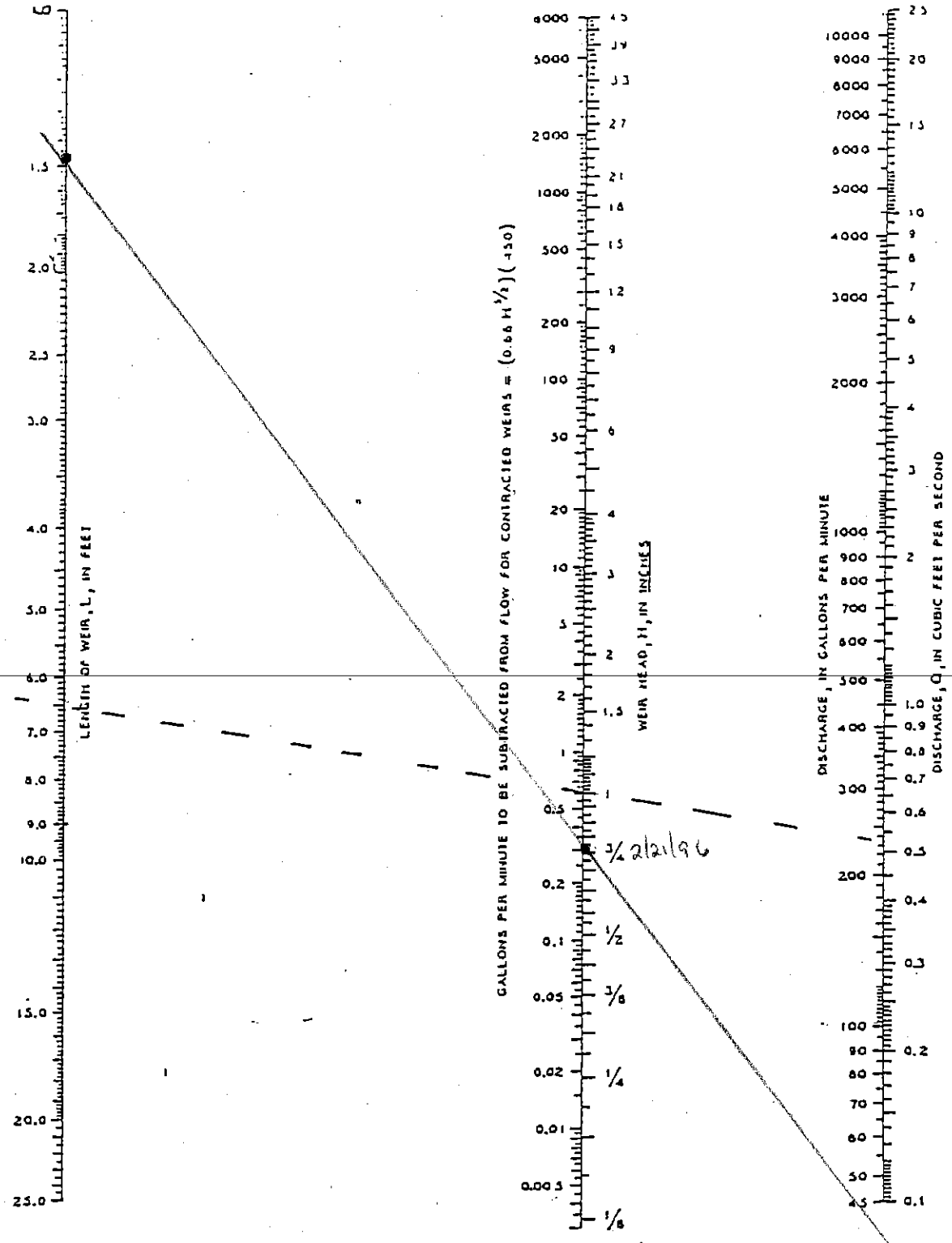


Figure 4.0



NOTE: Based on Francis weir formula as follows:

$Q = 3.33LH^{3/2}$ (for suppressed weir)

or

$Q = 3.33(L - 0.2H)H^{3/2}$
$= 3.33LH^{3/2} - 0.66H^{3/2}$ (for contracted weir with two end contractions)

Where:

Q = discharge, in cubic feet per second.
L = length of weir, in feet.
H = head, in feet.

Knowing the "head" over the weir, the flow through the separator can be obtained directly from the Nomograph.

Note: On multiple chamber CVTS separators, the head flow should be multiplied by the number of chambers installed.

Examples:
Given: Weir length 7'-6"
Number of chambers = 2

Measured:
H = head = 1"

Draw a straight line connecting point 7.5' on "Length of Weir" scale and 1" on "Weir Head" scale. Continue the straight line until it intersects "Discharge" scale and read flow in either gpm or ft^3/sec.

Flow per chamber, from Nomograph
Q = 230 gpm
Total flow through separator = 230 x 2 = 460

Note: Mack Industries is not responsible for the performance of units operating at flow rates greater than the design flows. An excessive flow rate can result in a poor quality effluent, plus the possible skimming of water if manual (rotary pipe or trough) skimming devices are installed.

Oil removal rates can be increased or decreased by effluent weir plate adjustment.

OUTLET — OUTFLOW

Clarified water exits the separator through a "T" pipe which allows it to exit through the bottom of the pipe only.

Operational and Maintenance Instructions

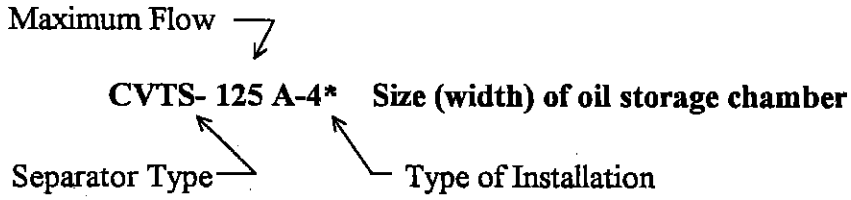
GENERAL

Instructions contained herein pertain to CVTS models designed for flows of 100 gpm and greater. Refer to CVTS assembly drawing contained in this manual and determine model furnished. It will be helpful to become fimiliar with the part names, their locations, and principles of operation of the separator.

NOMENCLATURE

From the model number given in the equipment specifications contained in this manual, the separator design flows, type of installation, and wheter the tank is furnished with an

integral oil (product) storage chamber can be easily determined. The CVTS model coding is as follows:



* **Note:** It this figure is omitted, the separator does not have a storage chamber.

Two basic models of CVTS separators are available: **a)** individually constructed units designed for flows up to and including 400 gpm and, **b)** units designed for flows greater than 400 gpm and constructed as described below.

CVTS MODELS DESIGNED FOR FLOWS GRATER THAN 400 GPM

Construction

Models designed for flows grater than 400 gpm are constructed using two or more chambers consisting of units rated for flows of 400 gpm or less.

The chambers are integrally enclosed in one envelope and are, as standard, partitioned into symmetrical sections for proper flow distribution.

Each module is identical in cross section and is designed to process an equal fraction of the total incoming flow.

On identical chamber construction, each section may have the same size inlet and outlet nozzles located at the same elevation and located with respect to each module, or may be furnished with one inlet nozzle and an internal manifold for directing flow to individual chambers.

In order to equalize hydraulic loadings, the partition walls that are separating the chambers are designed with equalizing slots (openings) which are located in the influent and effluent chamber on units with isolated chambers or one equalizing opening in separating chamber partition wall when units are provided with internal inlet manifold.

The oil collection troughs are also connected through the partition walls and act as one unit.

OPERATION

1. With the hook-up of the inlet, oil, water outlet, and surge connections, the separator is ready for operation. The separator does not have any moving (or rotating) parts and therefore, no special precautions, except periodic checking and cleaning are required for a satisfactory performance.

2. Sediment buildup in the separation chamber should be checked and removed when a five or six inch accumulation is reached.

3. Sludge buildup withdrawal form the separation chamber can be accomplished through a sludge draw-off pipe, located in the separation chamber and extended above the coalescing tubes or through side walls. The draw-off pipe is flanged and can be attached to a mating flange of a pump section.

If a flanged pump suction pipe is not available, the pump suction hose can be inserted into the draw-off pipe for sludge withdrawal.

The inlet chamber should be inspected periodically for sludge accumulation. Sludge and solids should be removed as required.

4. Coalescing Tubes Removal: Before tubes can be removed, the top grating, holding the tubes, must be unbolted and removed.

Tube packs then are removed individually. After tubes are removed, the bottom grating supporting tube packs should also be removed. A vacuum truck or similar sludge removal means should be used for sludge removal. The tubes should be placed back in the separation chamber and the unit put back in operation.

Coalescing tubes should also be periodically inspected and cleaned. A good indication that the tubes need cleaning is a decrease in effluent quality, providing the unit is operated at design flows, or water backing up at the inlet and separation chamber. For proper cleaning, the tube packs should be removed and steam cleaned or pressure washed. When pressure washing, use bio-degradable cleaning detergents suitable for grease and oil.

NOTE: In most cases it is not necessary to empty the separator for cleaning. The separator has been designed to collect solids in specific areas. Solids should be pumped or vacuumed from the collection areas.

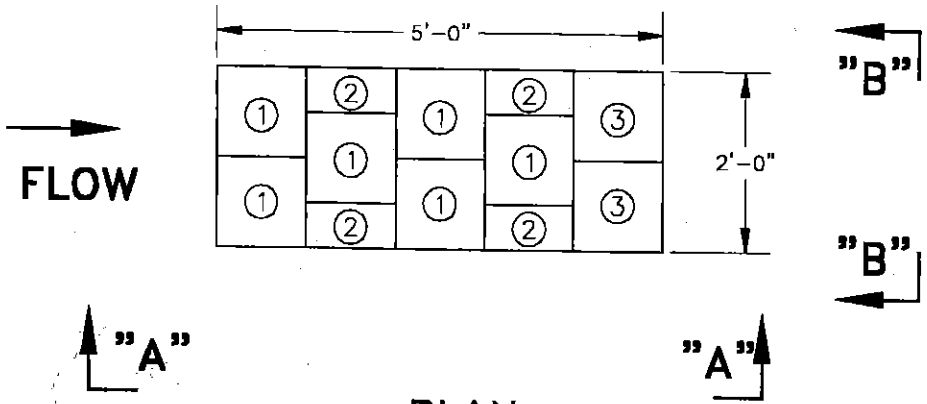
1. Sludge level accumulation in the influent and separation chamber should be periodically checked.

2. Oil trough and oil discharge opening(s) or nozzles should be inspected periodically for debris accumulation and plugging.

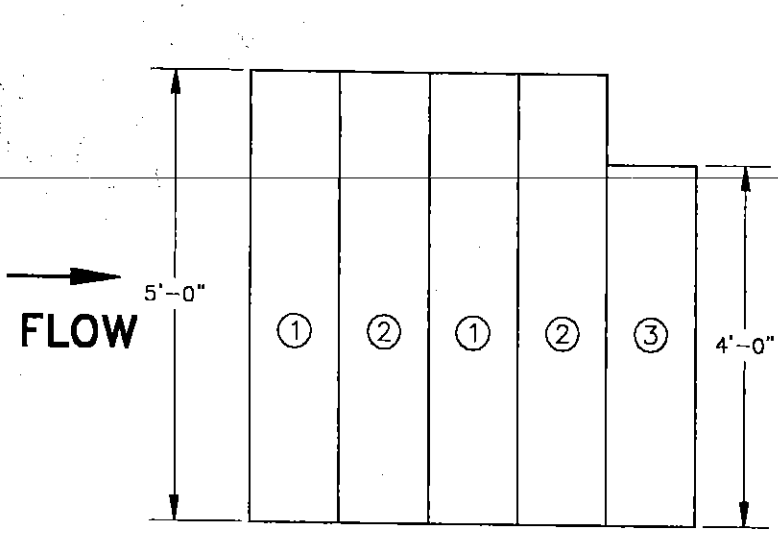
3. On constructed modular units the flow equalization ports/slots should be periodically checked for plugging.

4. If pumps, skimmers or other auxiliary equipment is furnished with the separator check and lubricate equipment as required by manufacturer or as described in separate instructions contained in this manual.

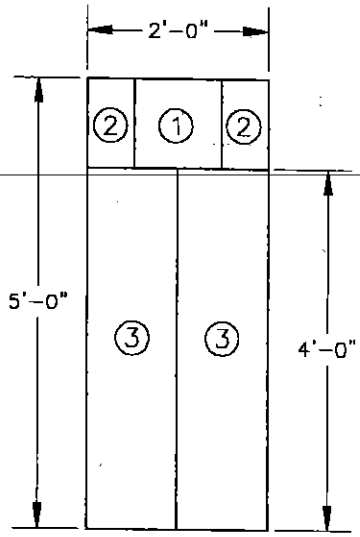
NOTE: For additional instructions on operation and maintenance of the separator, refer to the Troubleshooting Guide contained in this manual.



PLAN



ELEVATION "A-A"



ELEVATION "B-B"

ITEM	QTY.	SIZE
1.	(6)	1'-0" x 1'-0" x 5'-0" H.
2.	(4)	0'-6" X 1'-0" x 5'-0" H.
3.	(2)	1'-0" x 1'-0" x 4'-0" H.

AFL INDUSTRIES, INC.
3661 BLUE HERON BLVD., RIVIERA BEACH, FLA. 33404

SCALE: NONE	THIS DRAWING AND SPECIFICATION IS THE PROPERTY OF AFL INDUSTRIES, 3661 BLUE HERON BLVD. RIVIERA BEACH, FLA. 33404 AND SHALL NOT BE REPRODUCED WITHOUT WRITTEN PERMISSION.	DRAWN BY: TMB
DATE: 1/26/00		CHECKED BY:
MODEL: STANDARD CVTC-125 TUBE ARANGEMENT		AFL JOB No. 00014
JOB: MACK INDUSTRIES		DRAWING No. 1S320
		FILE: 0014-7A

CDF005763

3661 W Blue Heron Blvd, Riviera Beach, Florida Tel: (561) 844-5200 Fax: (561) 844-5246

PACKING LIST

Shipped To:	Canton Drop Forge
Address:	4575 Southway SW
City:	Canton, OH 44706
Attention:	Keith Houseknecht

PO Number	Job Number	Shipped Via	Date Shipped
4544	00014	ABF Freight	1/26/2000

Ordered	Shipped	Description
1 set	1 set	Replacement tubes for CVTC-125 consisting of:
		6 each - 12" x 12" x 60" 4 each - 12" x 6" x 60" 2 each - 12" x 12" x 48"
		For AFL Job 95392
3 cartons		

1-31-00

Troubleshooting Guide

INTRODUCTION

After selection and installation of the appropriate oil/water separator, there may be instances when the unit does not appear to be functioning at the expected performance level. Generally, these problems stem from a readily correctable mechanical malfunction. In an effort to make these solutions more readily found, this problem troubleshooting guide has been compiled.

A. FREE OIL IN THE EFFLUENT

Cause	Remedy
1. CVTS Tubes above the water level	
a. Water level too low	Raise discharge weir
b. Tubes floating	Check grating to be sure it is in place and is weighing down all tube packs
2. Skimmers not removing oil	Weir plate skim edge should be 1/8" above water line or adjusted to desired elevation Leading edge should be just above water line
3. Oil build-up behind sheen baffle	Remove oil by manual skimmer or siphoning, oil sorbents, or other means
4. Weirs not level	Adjust for an even water/oil flow over weir
5. Excessive flow through unit	Reduce flow rate to design rate

B. WATER BACKING UP AT INLET CHAMBER

Cause	Remedy
1. CVTS tubes blinded	
a. High solids level	Remove tube packs and clean. Determine source of solids and possibility of recurrence. Was it an

	accidental dump, a recurrent dump, or a process change?
b. Algae build-up	Remove tube packs and clean. If a recurrent problem, a commercial algaecide may be required
2. Excessive flow	Reduce flow to within ratings

C. FOAMING

Cause	Remedy
1. Cleaners/surfactants	
a. Batch dump	Flush system. Determine recurrence probability. A commercial antifoam may be needed
b. Process change	Return to former products. Low-foaming substitutes may be possible. If not, an anti-foam may be required
2. Air in piping	
a. Pumps drawing air	Raise liquid level, reduce flow
b. Opening/leak in piping	Seal leak/hole
3. Polymer overdose	Reduce chemical feed rate. Check that solution strength, mixing feed rates, and pumps are all in order.

D. SOLIDS IN EFFLUENT

Cause	Remedy
1. Sludge build-up beyond recommended level	Clean tank compartments, remove remove sludge
a. Manual removal	Increase maintenance frequency
b. Pump-out package	Check for correct operation of level sensors, timers, pumps, piping. Increase draw-off rate if necessary

2. Solids not settling

a. Excessive flow and decreased retention time	Reduce flow rate
b. Particles too fine or light to settle	Use a coagulant aide type of polymer, or increase dosage if already in use

E. EMULSIFIED OIL IN EFFLUENT

Cause	Remedy
1. Mechanical emulsification	
a. Pump throttled down too far	Open valve that is reducing flow; put pump on timer for intermittent flow; or change pump size or type
b. Mixers	Reduce speed; change impeller number, size, or configuration; or put mixer on a timer for intermittent mixing.
2. Chemical emulsification	
a. Synthetic coolants	If accidental, one-time dump - flush system. If recurrent problem - segregate from general wastestream; return to prior process; investigate effectiveness of chemical treatment.
b. Cleaners/surfactants	If accidental, one-time dump - flush system. If recurrent problem - segregate and/or treat chemically or return to former cleaners.

ROTARY PIPE SKIMMER

Design

The MACK Rotary Pipe Skimmer (RPS) is designed to remove products such as oil, animal fats and floc from MACK type separators, clarifiers or skim tanks. This style is ideal for heavy or viscous product, and the best operation is achieved when specific gravity's between liquid and material to be skimmed are great.

Constructed entirely of corrosion-proof materials, (see equipment specifications for type of construction materials furnished), the RPS can operate in a wide variety of environments with minimal maintenance.

MANUAL OPERATION

The operation of the RPS requires periodic checks of the product level in the tank. The operator decides how much of the product he wants to collect in the tank before skimming. When the product level is sufficiently thick to operate the skimmer, the skimmer is rotated about its axis and the skimming edge lowered into the product. As the product spills into the skimmer, it flows by gravity out of the skim pipe, through the wall of the separator, and into a product storage tank for accumulation and subsequent removal. The operator must maintain a watch on the product being skimmed. When water appears to be entering the skimming pipe, the skimmer must be rotated to an up-right or non-skim position. Automatic skimming is possible, but requires a continuously thick product level as described below.

AUTOMATIC SKIMMING - UNATTENDED OPERATION

Automatic operation is recommended only on applications where the specific gravity of oil and/or material to be skimmed is known, will not change during operation, and the flow through the unit will remain constant.

To adjust the Rotary Pipe Skimmer for automatic operation, the skimming edge of the skimmer pipe should be set 1/4" above maximum water level (at design flow), see Separator Operating Instructions in this brochure for procedures to calculate maximum liquid level.

With this setting, the skimming operation will be continuous the moment the oil layer floating on the surface is greater than 1/4".

MAINTENANCE

1. Periodically check skimmer assembly and make sure skimmer level and attitude have not changed.

2. Check scum and grease accumulation in pipe and outlet connection weekly and scrape or hose the assembly when required.

RPS Operation & Maintenance Instructions

GENERAL

Refer to manual skimmer assembly drawing on a specific tank installation included in this brochure. It will be helpful to become familiar with part names and their location.

NOMENCLATURE

The letter following the MACK model, RP, designates the axis about which the skimmer rotates. The model described in this instruction is RP-C, or concentric axis and designates skimmer rotation about centerline of skimmer pipe which coincides with oil outlet pipe centerline. See Fig. 1.0 for a typical skimmer assembly and component parts.

SKIMMER COMPONENTS

Model RP-C skimmers consist of five major components as described below and shown in Fig, 1 and 2.

1. Skimmer pipe with 90 slots, Item 3
2. Mounting bracket complete with trunnion, Item 2
3. Compression coupling, Item 4, as shown in Fig. 1
4. Outlet discharge connection
5. Adjustment handle, Item 5

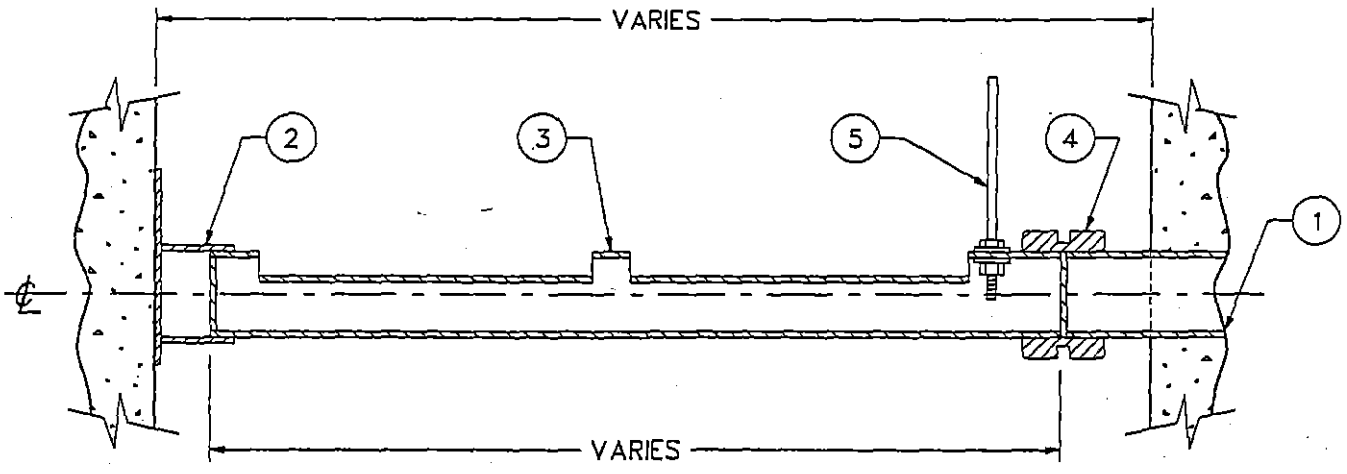


Figure 1.0 Skimmer Assembly

INSTALLATION

Depending on contract requirements, skimmer assembly may be shipped factory installed in Mack Industries process tank or separately for field installation in a designated location. Check equipment specifications and drawings and determine how the skimmer was ordered and follow accordingly.

A. Factory Installed Skimmers

1. Install and level the tank, see tank installation instructions in this brochure, and connect all required piping, controls, valves, etc.

2. Remove tape and support braces.

3. Check skimmer for rotation, skimmer should not rotate freely since the friction in the swivel joints maintains skimmer position.

4. Position skimmer with the handle in vertical position, as shown in Fig. 2.0.

5. Skimmer is ready for operation

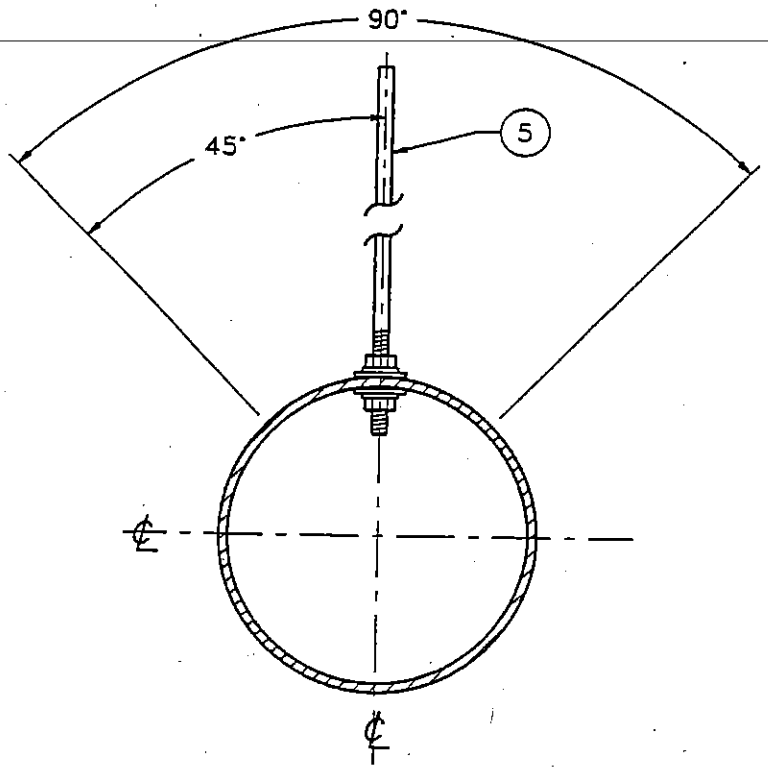
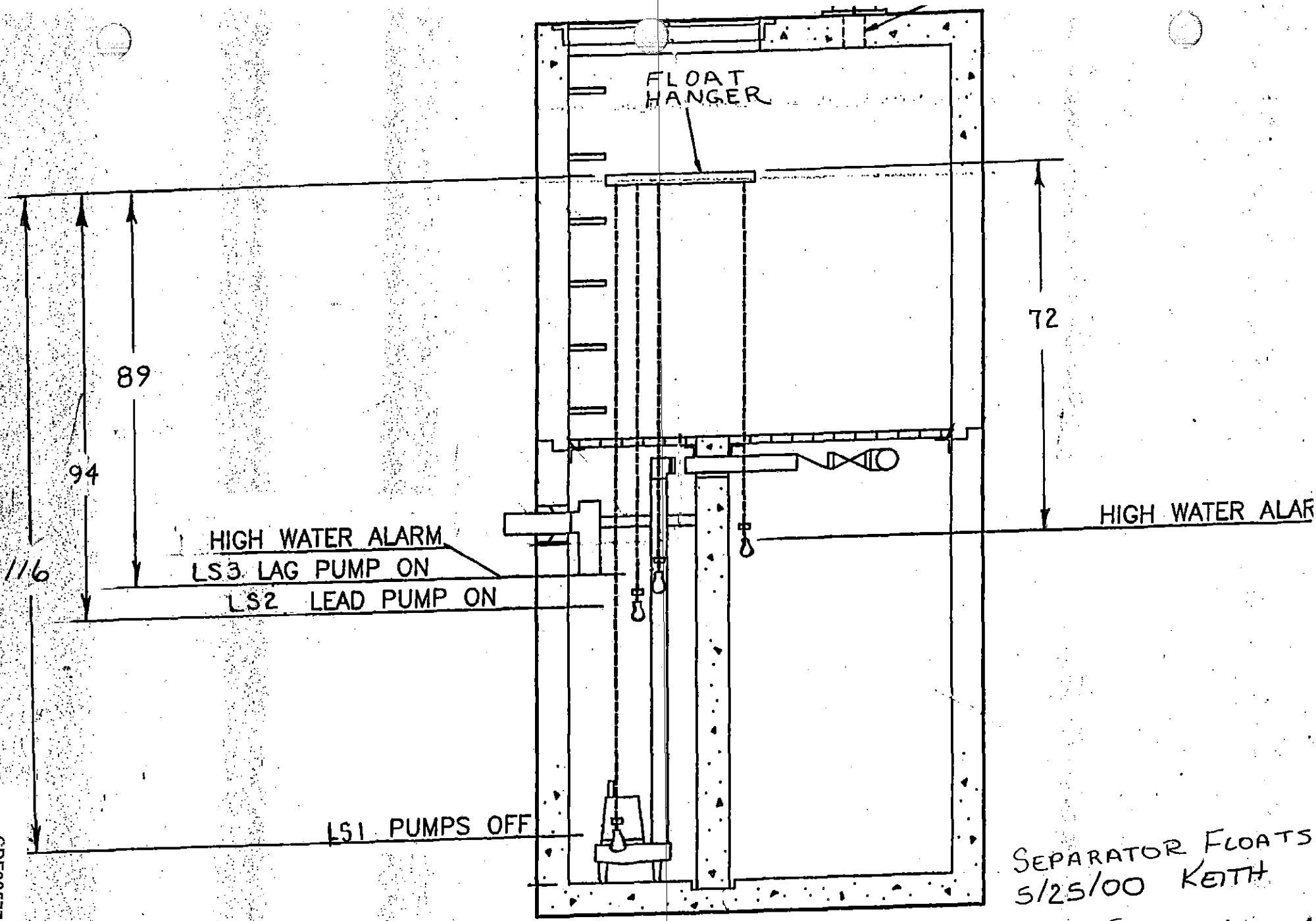


Figure 2.0



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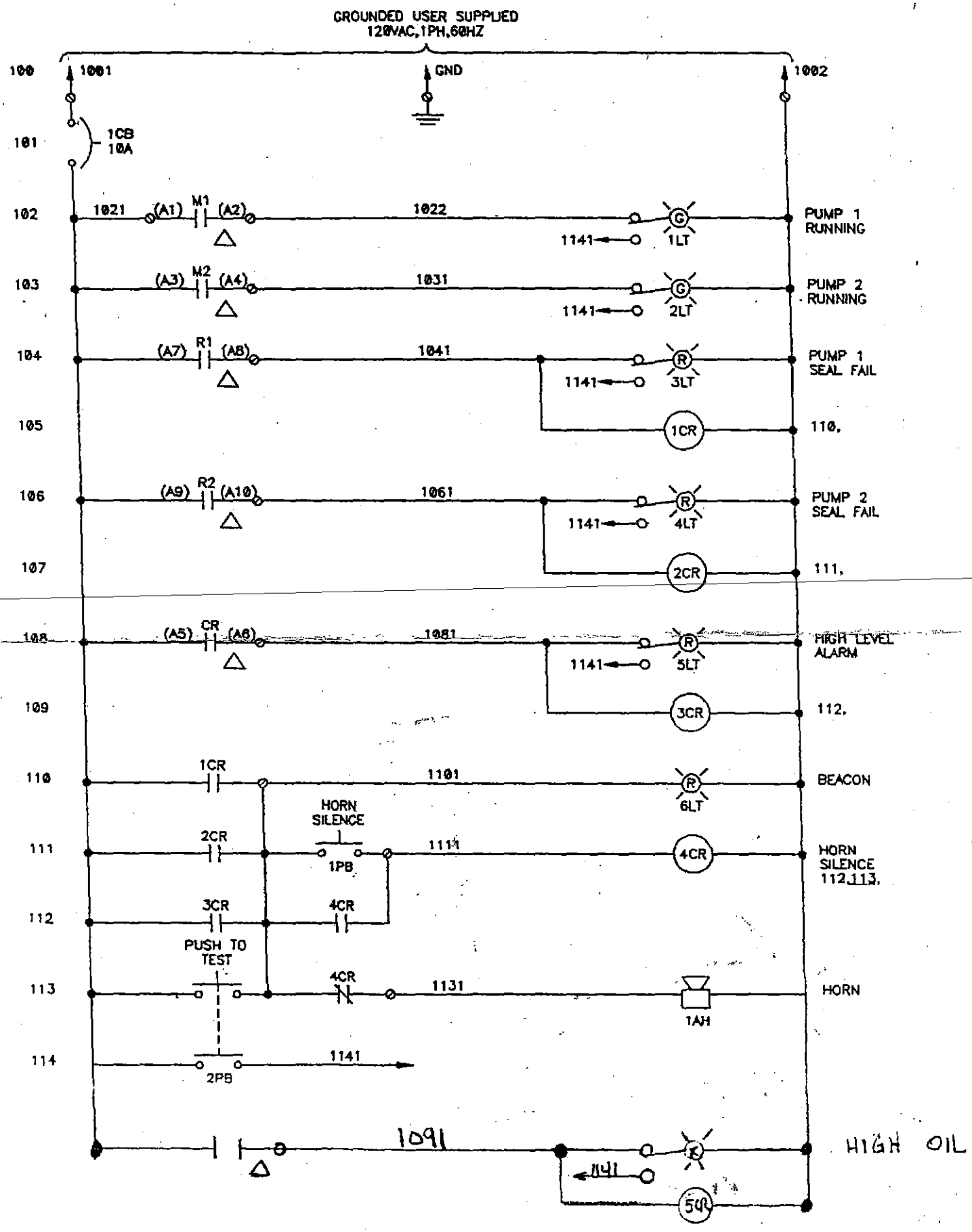
SEPARATOR FLOATS
5/25/00 KEITH
00-15


GROUNDED USER SUPPLIED
120VAC,1PH,60HZ
100
1001
GND
1002
101
1CB
10A
102
1021
(A1)
M1
(A2)
1022
1141
1LT
PUMP 1
RUNNING
103
(A3)
M2
(A4)
1031
1141
2LT
PUMP 2
RUNNING
104
(A7)
R1
(A8)
1041
1141
3LT
PUMP 1
SEAL FAIL
105
1CR
110,
106
(A9)
R2
(A10)
1061
1141
4LT
PUMP 2
SEAL FAIL
107
2CR
111,
108
(A5)
CR
(A6)
1081
1141
5LT
HIGH LEVEL
ALARM
109
3CR
112,
110
1CR
1101
6LT
BEACON
111
2CR
HORN
SILENCE
1PB
1111
4CR
HORN
SILENCE
112,113,
112
3CR
4CR
PUSH TO
TEST
113
4CR
1131
1AH
HORN
114
2PB
1141
1091
1141
5CR
HIGH OIL

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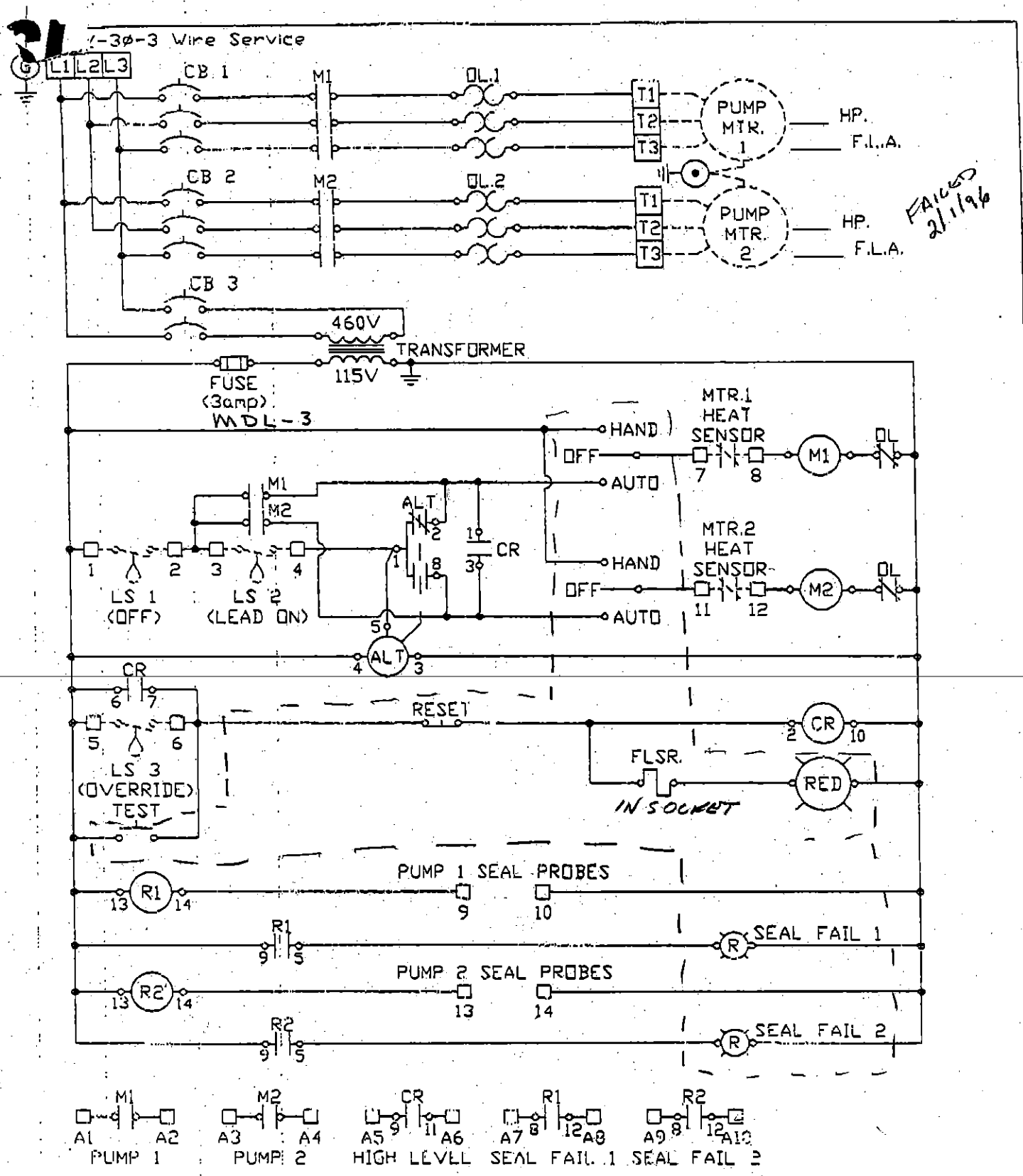

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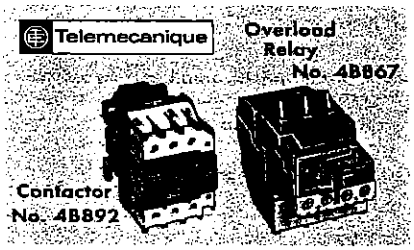
1) Level Switches Must Be Rated A Minimum Of 2 Amps @ 120 Volts.
2) Torque All White Field Wiring Terminals To 20 In.Lbs.
3) Field Wiring Must Be 60°C Copper Wire Minimum.
4) - - - - - - = Items Not Supplied In Panel

DRWN.	DATE	Chandler Systems, Inc.
TAD	11/20/95	
CHKD.	DATE	SCALE: NONE
		DRWG. NO. A-MACK14

BUILT BY CSI - JIM PARK - 419-281-5767

IEC MOTORS STARTERS, MAGNETIC, OPEN



MOTOR STARTER = CONTACTOR + OVERLOAD RELAY

CONTACTORS

- Designed for industrial motor control applications
- Rugged design ensures high mechanical and electrical life
- Overload relay mounts directly to underside of contactor
- Contactors are not enclosed

OVERLOAD RELAYS

- Bi-metallic, ambient compensated
- Lockable and sealable Manual/Automatic reset
- Adjustable current range
- Separate "Stop" and "Reset" controls and trip indicator

UL E48539

CSA LR43364

3 POLE, NON-REVERSING CONTACTOR SPECIFICATIONS AND ORDERING DATA

Amp Rating Ind.	Amp Rating Res.	Auxiliary Contact	Horsepower Ratings: Single Phase 115V	Single Phase 230V	Three Phase 200V	Three Phase 230V	Three Phase 460V	Three Phase 575V	Coil Voltage 60Hz	Use Overload Relay Order Below	Dimensions (in.) H	W	D	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
9	20	1 NC	0.5	1	2	2	5	7.5	110VAC	A-L	3.15	1.77	2.91	LC1D0901F7†	2CJ62	$91.00	$84.00	0.7
9	20	1 NO	0.5	1	2	2	5	7.5	24 120 208 110 240	A-L	3.15	1.77	2.91	LC1D0910B7† LC1D0910G6 LC1D0910L6 LC1D0910F7† LC1D0910U7†	4B892 4B891 1H429 2CJ68 1H455	91.00 91.00 91.00 91.00 91.00	84.00 84.00 84.00 84.00 84.00	0.8 0.8 0.7 0.8 0.7
12	25	1 NO	1	2	3	3	7.5	10	24 110 120 208 240	A-M	3.15	1.77	2.91	LC1D1210B7† LC1D1210F7† LC1D1210G6 LC1D1210L6 LC1D1210U7†	4B890 2CJ81 4B889 4B315 4B328	115.00 115.00 115.00 115.00 115.00	106.15 106.15 106.15 106.15 106.15	0.8 0.8 0.8 0.7 0.7
18	35	1 NO	1	3	5	5	10	15	24 110 120 208 240	A-N	3.34	1.77	2.91	LC1D1810B7† LC1D1810F7† LC1D1810G6 LC1D1810L6 LC1D1810U7†	4B888 2CJ91 4B887 4B886 4B362	131.00 131.00 131.00 131.00 131.00	120.95 120.95 120.95 120.95 120.95	0.7 0.8 0.8 0.5 0.8
18	35	1 NC	1	3	5	5	10	15	110	A-N	3.34	1.77	2.91	LC1D1801F7†	2CJ87	131.00	120.95	0.8
[illegible]	40	1 NO	2	3	7.5	7.5	15	20	24 120 208 240	A-P	3.66	2.20	3.30	LC1D2510B7† LC1D2510G6 LC1D2510L6 LC1D2510U7†	4B885 4B884 6B402 5B310	146.00 146.00 146.00 146.00	134.80 134.80 129.80 134.80	1.2 1.2 1.2 1.1
32	50	1 NO	2	5	10	10	20	30	24 120 208 240	A-P	3.86	2.20	3.30	LC1D3210B7† LC1D3210G6 LC1D3210L6 LC1D3210U7†	4B883 4B862 5B311 5B312	166.00 166.00 166.00 166.00	153.25 153.25 153.25 153.25	1.2 1.2 1.2 1.2
40	60	1 NO + 1 NC	3	5	10	10	30	30	24 120 208 240	Q-R	4.49	3.34	5.00	LC1D4011B7† LC1D4011G6 LC1D4011L6 LC1D4011U7†	4B881 4B880 5B313 5B314	211.00 211.00 211.00 211.00	195.00 195.00 195.00 195.00	2.5 3.1 2.5 3.0
50	70	1 NO + 1 NC	3	7.5	10	15	40	40	24 120 208 240	Q-S	4.49	3.34	5.00	LC1D5011B7† LC1D5011G6 LC1D5011L6 LC1D5011U7†	4B879 4B878 5B315 5B316	226.00 226.00 226.00 226.00	208.75 208.75 208.75 208.75	3.1 3.1 3.0 2.5
65	80	1 NO + 1 NC	5	10	20	20	50	50	24 120 208 240	Q-T	4.49	3.34	5.00	LC1D6511B7† LC1D6511G6 LC1D6511L6 LC1D6511U7†	4B877 4B876 5B540 5B601	311.00 311.00 311.00 311.00	287.25 287.25 287.25 287.25	3.1 3.1 2.5 2.8
80	110	1 NO + 1 NC	7.5	15	25	30	60	60	24 120 208 240	Q-V	4.49	2.95	5.00	LC1D8011B7† LC1D8011G6 LC1D8011L6 LC1D8011U7†	5B602 4B875 5B603 5B604	351.00 351.00 351.00 351.00	324.00 324.00 324.00 324.00	3.5 3.5 3.0 3.5
12	25	1 NO	1	2	3	3	7.5	10	12VDC	A-M	4.92	2.75	2.91	LP1D1210JD	2CK70	140.00	129.25	1.5

(†) 50/60 Hz.

OVERLOAD RELAY ORDERING DATA

Key	Adjustable Range in Full-Load Amps	Dimensions (In.) H	W	D	Telemecanique Model LR2D...	Stock No.	List	Each	Shpg. Wt.
A	0.10-0.16				1301	4B867	$58.00	$53.55	0.4
B	0.16-0.25				1302	4B866	58.00	53.55	0.4
C	0.25-0.40				1303	4B865	58.00	53.55	0.4
D	0.40-0.63				1304	4B864	58.00	53.55	0.4
E	0.63-1.0				1305	4B863	58.00	53.55	0.4
F	1.0-1.6	3.62	1.77	1.85	1306	4B862	58.00	53.55	0.4
G	1.25-2.0				13X6	5B794	58.00	53.55	0.4
H	1.6-2.5				1307	4B861	58.00	53.55	0.4
I	2.5-4.0				1308	4B860	58.00	53.55	0.4
J	4.0-6.0				1310	4B859	58.00	53.55	0.4
K	5.5-8.0				1312	4B858	60.00	55.40	0.4
L	7.0-10.0				1314	4B857	60.00	55.40	0.4
M	9.0-13.0	3.62	1.77	1.85	1316	4B856	$60.00	$55.40	0.4
N	12.0-18.0				1321	4B855	60.00	55.40	0.5
O	17.0-25.0				1322	4B854	60.00	55.40	0.4
P	23.0-32.0	3.62	2.17	2.32	2353	4B853	71.00	65.55	0.6
Q	23.0-32.0	4.29	2.92	2.12	3353	4B852	103.00	95.10	1.1
R	30.0-40.0				3355	4B851	103.00	95.10	1.2
S	37.0-50.0				3357	4B850	103.00	95.10	1.2
T	48.0-65.0				3359	4B849	103.00	95.10	1.2
U	55.0-70.0				3361	4B848	123.00	113.55	1.2
V	63.0-80.0				3363	4B847	123.00	113.55	1.2

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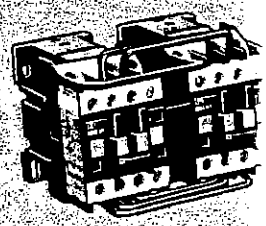


Open Type

Max. Full Load Amp Rating @ 600V: Inductive AC3 Duty	Resistive AC1 Duty	No. of Poles	S 1
9	20	3	
12	25	3	
	25	3	
18	35	3	
25	40	3	
12	25	4	
25	40		

(*) 2 NC Contacts are incorporated

Telemecanique

UL E3190 CSA

Amp Rating Resistive	Inductive	11
24	9	
24	9	
24	12	
24	12	
32	18	
32	18	
32	25	
32	25	
50	32	
50	32	

(†) 50/60 Hz

Orderi

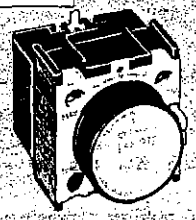
SACKS

CDF005775

IEC CONTACTOR AND MOTOR STARTER ACCESSORIES

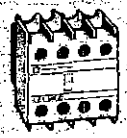
Telemecanique

Time Delay Contact Block



E164353 LR43364

Auxiliary Contact Blocks



No. 4B939

No. 4B921

TIME DELAY CONTACT BLOCKS

Mounting	Contacts NO	Contacts NC	Type	Range of Time Delay	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
Front Snap-On	1	1	On Delay	0.1 to 3 s*	LA2DT0	4B931	$127.00	$117.25	0.2
				0.1 to 30 s	LA2DT2	4B547	127.00	117.25	0.2
				10 to 180 s	LA2DT4	4B548	127.00	117.25	0.2
	1	1	Off Delay	0.1 to 3 s*	LA3DR0	4B928	127.00	117.25	0.2
				0.1 to 30 s	LA3DR2	4B549	127.00	117.25	0.2
				10 to 180 s	LA3DR4	4B550	127.00	117.25	0.2

(*) With extended scale from 0.1 to 0.6 seconds.

STANDARD, INSTANTANEOUS AUXILIARY CONTACT BLOCKS

Mounting	No. of Contacts	Contacts NO	Contacts NC	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
Front Snap-On	4	2	2	LA1DN22	4B939	$40.10	$37.05	0.1
		1	3	LA1DN13	4B941	40.10	37.05	0.1
		4	—	LA1DN40	4B937	40.10	37.05	0.1
		—	4	LA1DN04	4B944	40.10	37.05	0.1
		3	1	LA1DN31	4B938	40.10	37.05	0.1
	2	1	1	LA1DN11	4B942	20.00	18.46	0.1
		2	—	LA1DN20	4B940	20.00	18.46	0.1
		—	2	LA1DN02	4B945	20.00	18.46	0.1
Front	1	1	—	LA1DN10*	4B943	12.70	11.72	0.1
		—	1	LA1DN01*	4B946	12.70	11.72	0.1
Side Snap-On	2	1	1	LA8DN11†	4B922	20.00	18.46	0.1
		2	0	LA8DN20†	4B921	20.00	18.46	0.1

(*) 1 block only can be mounted on the LC1/LP1 D25 and D32; 2 blocks can be mounted on the LC1/LP1 D40 to D80.
(†) 1 block may be added to each side of the contactor.

IEC CONTACTOR REPLACEMENT COILS

Coil Voltage	For Contactor Series Type	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
24 @ 50/60 Hz	LC1D09, 12, 18, and CA2 Relays	LX1D2B7	4B846	$25.30	$23.35	0.2
	LC1D25, 32	LX1D4B7	4B841	34.80	32.15	0.2
	LC1D40, 50, 65, 80	LX1D6B7	4B837	40.10	37.05	0.7
120 @ 60 Hz	LC1D09, 12, 18, and CA2 Relays	LX1D2G6	4B845	25.30	23.35	0.2
	LC1D25, 32	LX1D4G6	4B840	34.80	32.15	0.2
	LC1D40, 50, 65, 80	LX1D6G6	4B836	40.10	37.05	0.8
208 @ 60 Hz	LC1D09, 12, 18, and CA2 Relays	LX1D2L6	4B844	25.30	23.35	0.2
	LC1D25, 32	LX1D4L6	4B839	34.80	32.15	0.2
	LC1D40, 50, 65, 80	LX1D6L6	4B835	40.10	37.05	0.7
240 @ 50/60 Hz	LC1D09, 12, 18, and CA2 Relays	LX1D2U7	4B842	25.30	23.35	0.2
	LC1D25, 32	LX1D4U7	6B399	34.80	30.95	0.2
	LC1D40, 50, 65, 80	LX1D6U7	6B400	40.10	35.65	0.7
480 @ 60 Hz	LC1D09, 12, 18, and CA2 Relays	LX1D2T6	4B843	25.30	23.35	0.1
	LC1D25, 32	LX1D4T6	4B838	34.80	32.15	0.2
	LC1D40, 50, 65, 80	LX1D6T6	4B834	40.10	37.05	0.5

Telemecanique MOUNTING KITS FOR OVERLOAD RELAYS

- Separate mounting kits with saddle clamp terminals
- For snap-on mounting to DIN rails

For Use With Overload Relay	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
LR2D1	LA7D1064	4B925	$8.40	$7.75	0.2
LR2D2	LA7D2064	4B924	12.70	11.72	0.2
LR2D3	LA7D3064	4B923	16.90	15.60	0.6

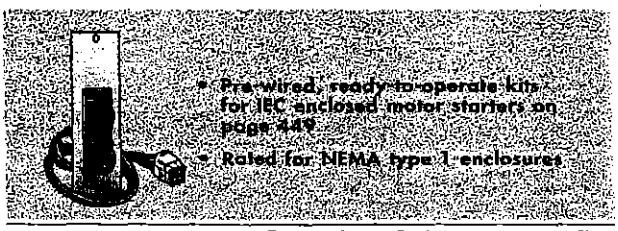
Telemecanique COIL SUPPRESSORS

- For reduction of electrical noise in AC or DC coils

Use With	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
LC-D09 - D80	LA4DA2U*	2CH99	$25.30	$23.35	0.1
LC-D09 - D32	LA4DA1U†	2CH96	25.30	23.35	0.1
LP-D09 - D32	LA4DC1U‡	2CJ01	25.30	23.35	0.1

(*) 110-240VAC screw connection.
(†) 110-240VAC snap-on connection.
(‡) 24-250VDC snap-on connection.

Telemecanique INSTA-KITS™



- Pre-wired, ready-to-operate kits for IEC enclosed motor starters on page 449
- Rated for NEMA type 1 enclosures

Description	Telemecanique Model	Stock No.	List	Each	Shpg. Wt.
Hand-Off-Auto Selector Switch	LA9C	6B156	$31.70	$28.20	0.7
Start/Stop Pushbutton	LA9A	6B154	31.70	28.20	0.8
Hand-Off-Auto Selector Switch w/Red or Green Pilot Light**	LA9CP12	6B157	92.00	81.80	0.8
Start/Stop Pushbutton w/Red or Green Pilot Light**	LA9AP12	6B155	92.00	81.80	0.8

(**) One pilot light with interchangeable lens.

SELF-P

Telemecanique

Amp Rating	230V
18	5
32	10
63	20

Thermal Setting Range	Magneti Setting Range
.10 - .16 Amps	
.16 - .25	
.25 - .40	
.40 - .63	
.63 - 1.0	Fixed
1.0 - 1.6	@ 15
1.6 - 2.5	Full Lo
2.5 - 4.0	Amp
4.0 - 6.0	
6.0 - 10.0	
10.0 - 16.0	
12.0 - 18.0	

A

Auxiliary Contact Configuration	Signa Conta Configur
2 NO + 1 NC	1 NO +
1 NO + 1 NC	1 NO
1 NO + 1 NC	1 NC
2 NO + 1 NC	—
2 NO + 1 NC	1 NO

Ord

CDF005776

MARK AND ADJUST YARD SEPARATOR FLOATS

Task No.		**Request Date**	03/09/2000
Tenant		**Request Time**	07:22:28
Assigned By		**Originator**	001
Assigned To		**Telephone No.**	
Scheduled Start Date		**Extension**	188
Scheduled Finish Date		**WO Type**	PLANNED
Perform by Warranty	No	**Completion Date**	5-5-00
Priority	3.00	**Completion Time**	
Expense Class			

Craft	Crew Size	Estimated Labor Hours
ELECT	1.00	2.00
PE	1.00	1.00

Completed Per Client 5-8-00

Equipment No.	BFOG23		
Equipment Description	MACK INDUSTRIES GRIT TANK & SEPARATOR		
Serial No.	TAG # 34475	**User-defined Field 1**	
Cost Center	36	**User-defined Field 2**	
General Ledger No.		**User-defined Field 3**	A-11045
Department	FORGE SHOP	**User-defined Field 4**	
Location	YARD SOUTH OF FORGE SHOP	**User-defined Field 5**	
Sub-location 1	-	**Must Be Down**	No
Sub-location 2	-	**Down Time**	
Sub-location 3	-	**Estimated Down Time**	
Reason for Outage			

Safety Notes

DATE 11/22/95 MFG IN SERVICE 1/19/1996. TAG# 34475, USF JOB No A-11045, TYPE APS-36X48, FROM MACK INDUSTRIES, W/ GRIT TANK INSTALLED TO THE WEST OF THE SEPARATOR.

Comments

MAKE FIVE METAL NAME TAGS, TO READ AS FOLLOWS
2 - HIGH WATER ALARM
1 - LAG PUMP ON
1 - LEAD PUMP ON
1 - PUMPS OFF
THE FLOATS ARE NOT ADJUSTED CORRECTLY, AS OF 3/9/00. PLEASE REVIEW THE DRAWING AND GET KEITH BEFORE MAKING THE ADJUSTMENTS.

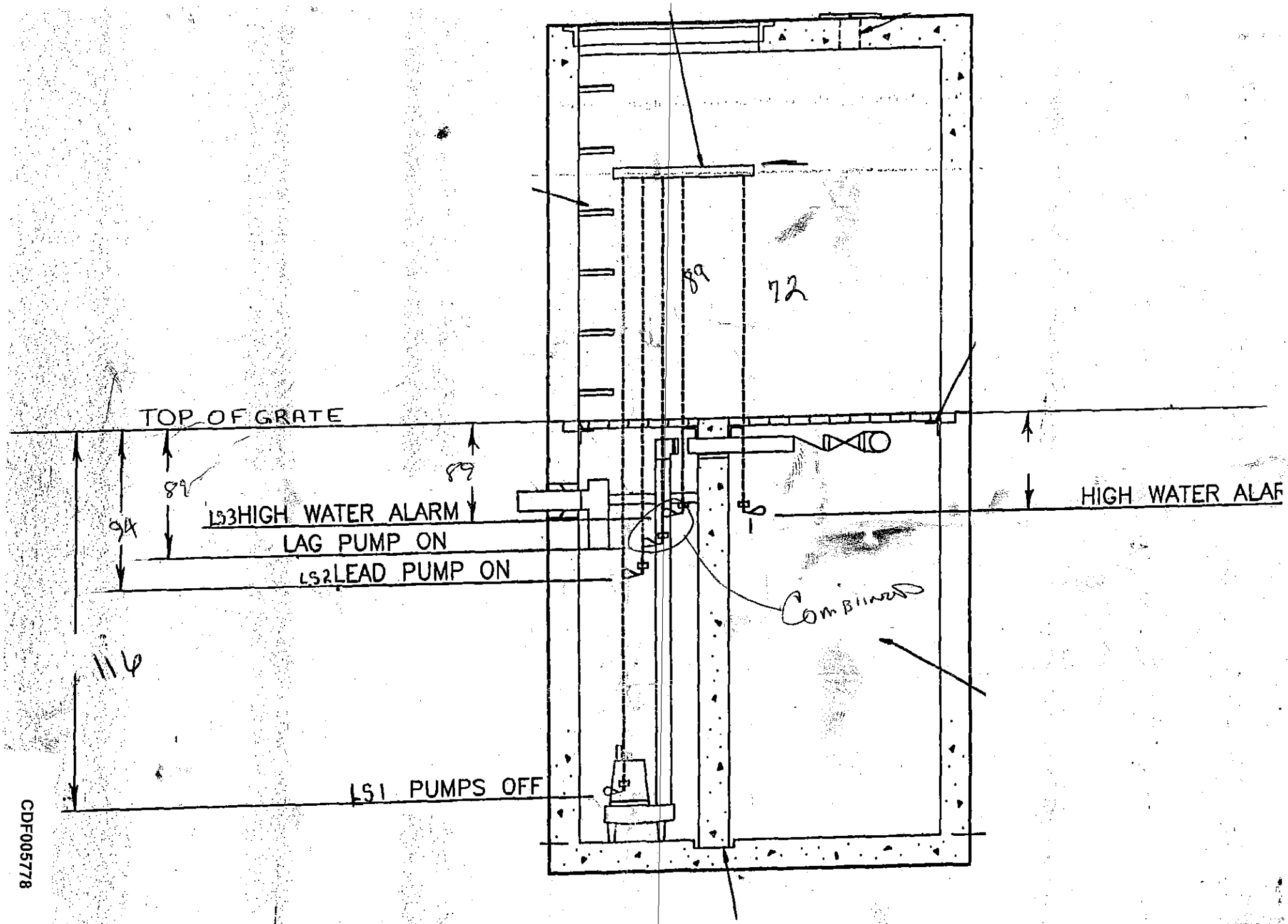
Equipment No.	Meter Name	Meter Reading

Item No.	Equipment No.	Description	Qty Required	Date Used	Qty Used	Total Unit

List extra parts and comments here

Drawing on Back

Employee Code	Equipment No.	Work Date	First Name	Last Name	Regular Hours	Overtime Hours


89
72
TOP OF GRATE
89
89
94
LS3 HIGH WATER ALARM
LAG PUMP ON
LS2 LEAD PUMP ON
HIGH WATER ALAR
Combined
114
LS1 PUMPS OFF

1(c)(d)(e)

Keith Houseknecht

From: Keith Houseknecht
Sent: Monday, May 09, 2005 2:21 PM
To: Todd Gray
Subject: FW: Oil Separator

Todd
Advanced Control Design Consultants is a small company in Magnolia, Ohio that we are doing business with for the first time. The project is a refurbish of electrical controls for our forge shop oil/water separator. Being small they have a problem with our terms. Could we change the terms to 50% down with the order and 50% net 55 days?
Keith

NET 30 OK PER TODD 6/2/05 CALLED HERSTINE

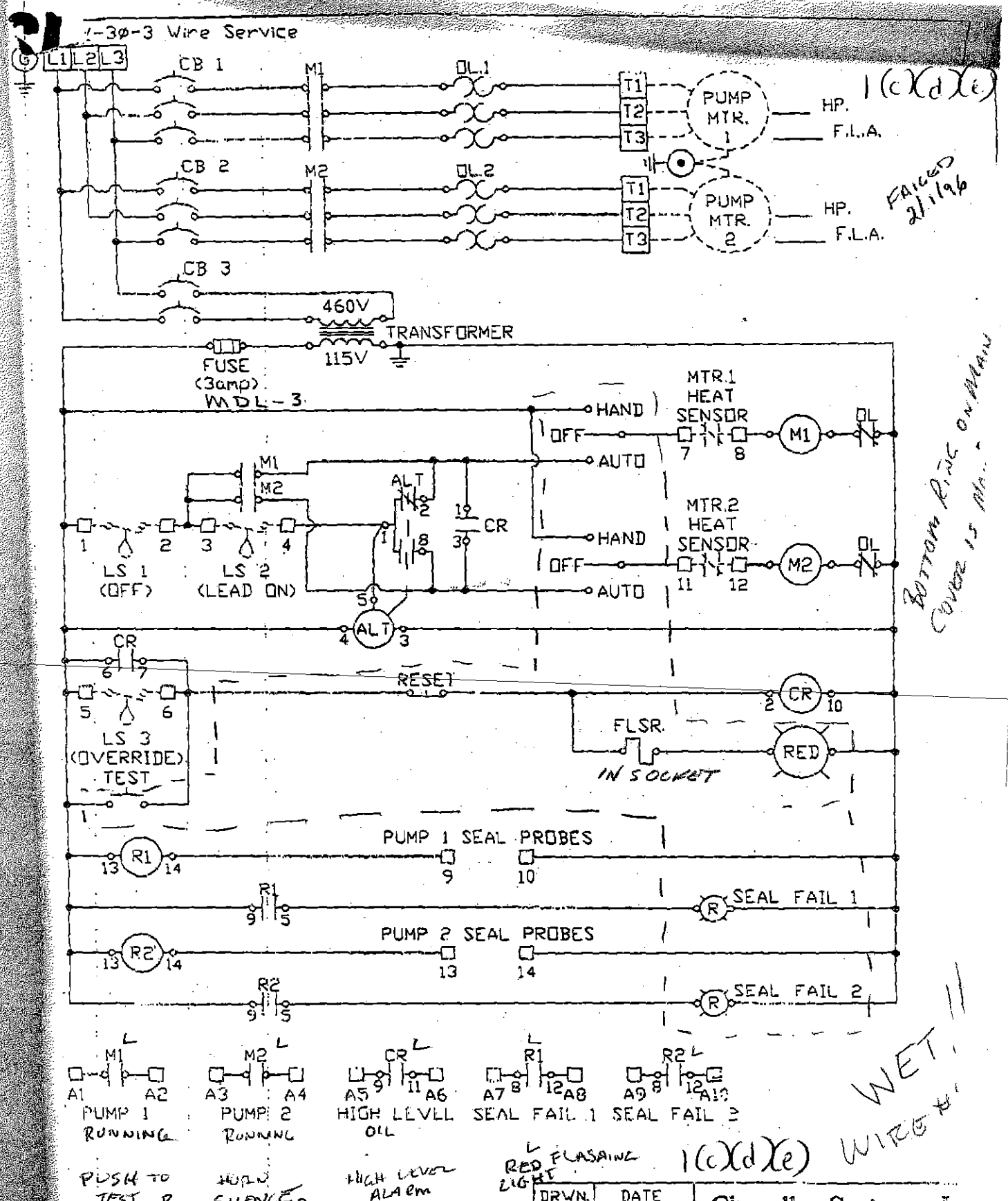
-----Original Message-----
From: John Herstine [mailto:jherstin@neo.rr.com]
Sent: Monday, May 09, 2005 12:07 PM
To: 'Keith Houseknecht'
Subject: RE: Oil Separator

Keith,

Give me a call at your convenience 330-866-2990. I need to ask your advise concerning the terms on the PO I received last week for the oil separation system.

Thanks,

John Herstine



DRWN.	DATE	Chandler Systems, I
TAD	11/20/95	
CHK'D.	DATE	SCALE / DRWG. NO.
		NONE / A-MACK

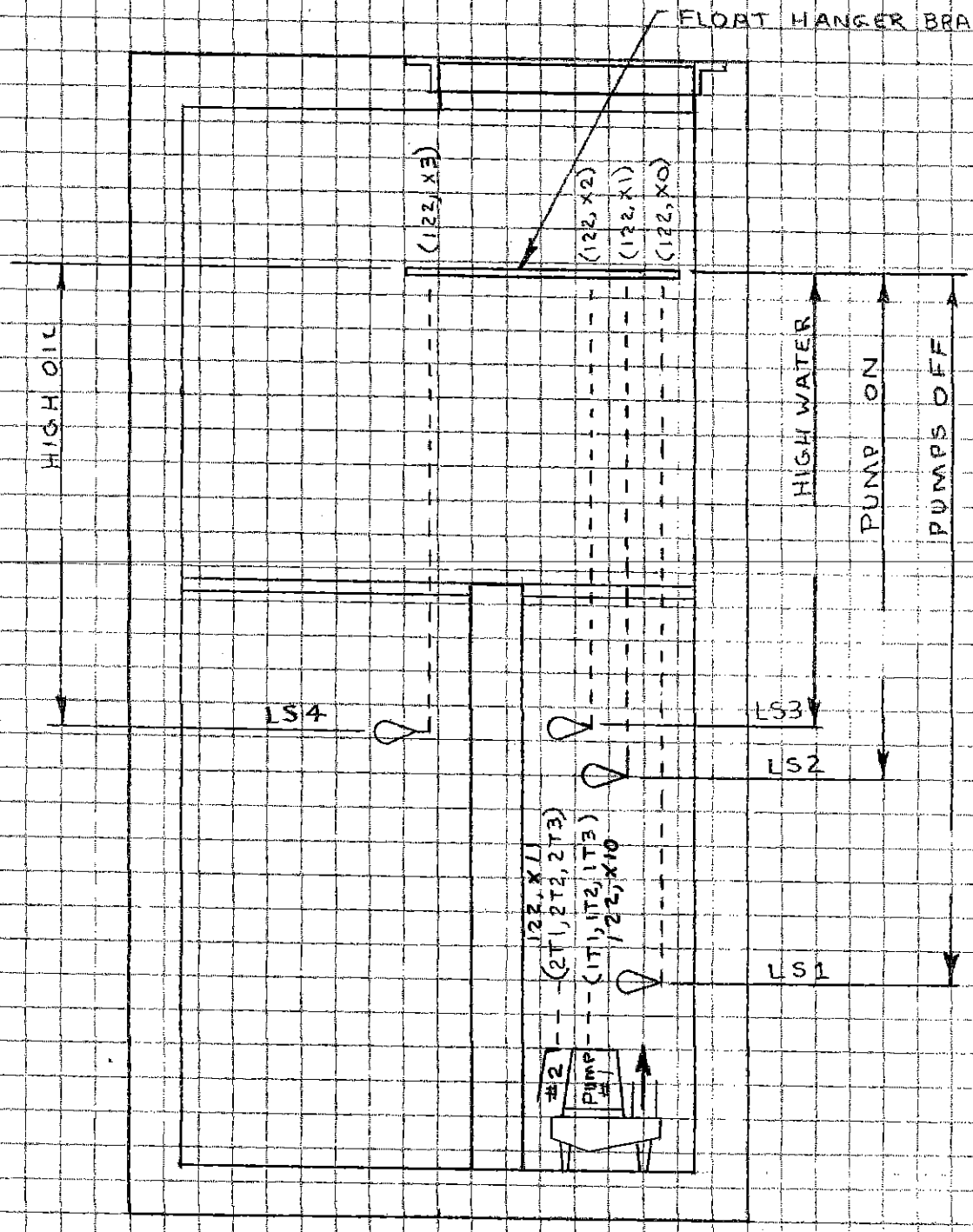
...ches Must Be Rated A Minimum Of 2 Amps @ 120 Volts.
...White Field Wiring Terminals To 20 In.Lbs.
...ng Must Be 60°C Copper Wire Minimum.
...Items Not Supplied In Panel

BUILT BY CSI - JIM PARK - 419-281-5767
12/9/04 - JIM LEFT MESSAGE TO CALL

TOTAL P.03

CDF005780

Champion
CCC Combustion Corporation
Wooster, OH 44691 • (216) 345-6915



Oil Separator

05-01
07-08-05
KJH
FORGE

CDF005781

1(c)(d)(e)

INSPECT THE FORGE SHOP OIL/WATER SEPARATOR

Task No.	FS03	**Request Date**	11/25/99
Tenant		**Request Time**	07:46:41
Assigned By		**Originator**	
Assigned To		**Telephone No.**	
Scheduled Start Date	11/25/99 00:00:00	**Extension**	
Scheduled Finish Date	11/25/99	**WO Type**	PREVENT
Perform by Warranty	No	**Completion Date**	12-20-99
Priority	2.00	**Completion Time**	4:00 pm
Expense Class			

Craft	Crew Size	Estimated Labor Hours
PIPE	1.00	1.00

Equipment No.	Equipment Description	Location	Sub-location 1	Sub-location 2	Sub-location 3
BFOG23	MACK INDUSTRIES GRIT TANK & SEPARATOR	YARD SOUTH OF FORGE SHOP	-	-	-

Item No.	Equipment No.	Description	Qty Required	Date Used	Qty Used

List extra parts and comments here

Employee Code	Equipment No.	Work Date	First Name	Last Name	Regular Hours	Overtime Hours
727			KIBLER		1	1
753			KENDRICK			

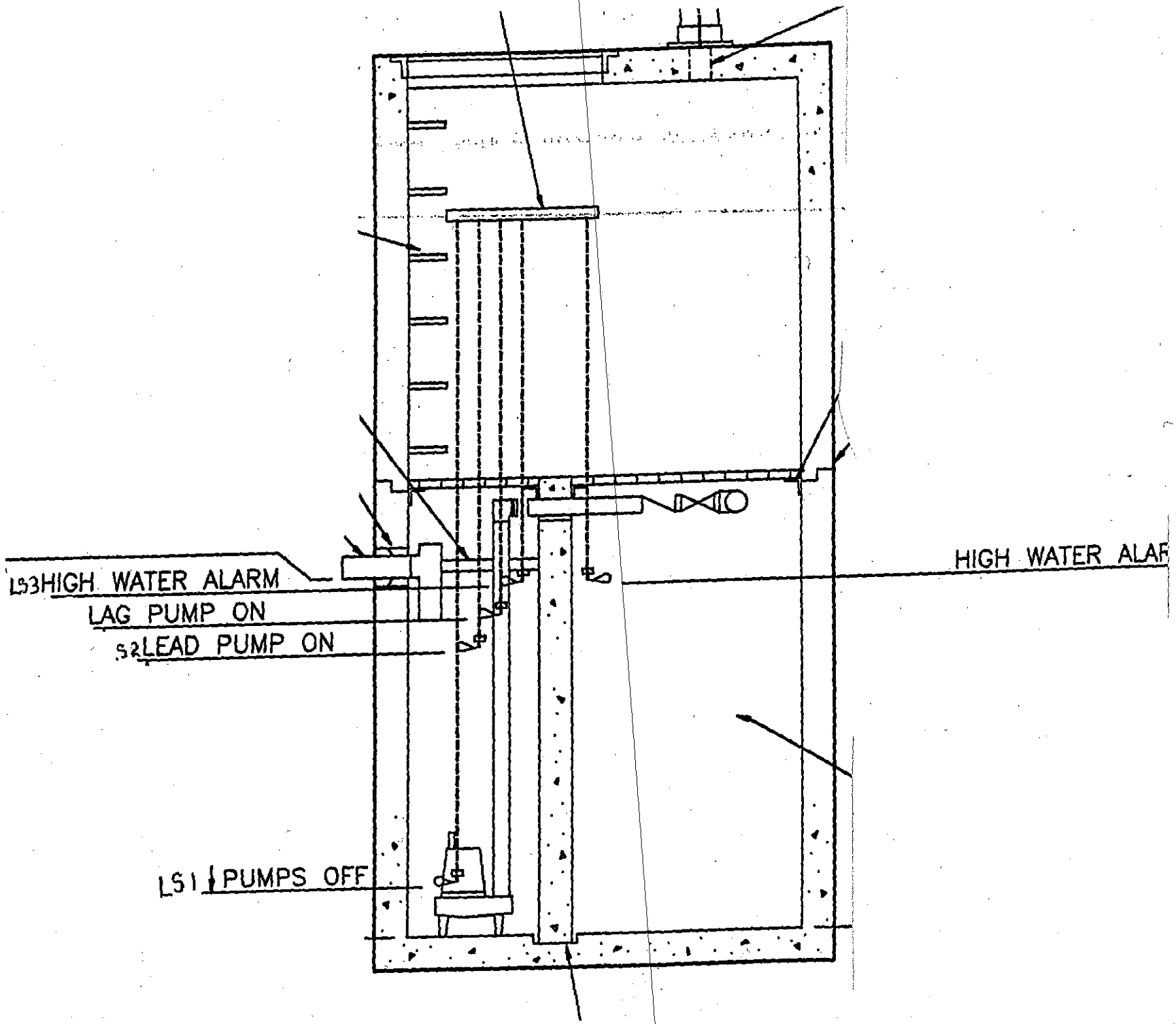
Safety Notes

Equipment No. BFOG23

DATE 11/22/95 MFG IN SERVICE 1/19/1996. TAG# 34475, USF JOB No A-11045, TYPE APS-36X48, FROM MACK INDUSTRIES, W/ GRIT TANK INSTALLED TO THE WEST OF THE SEPARATOR.

Task Instructions

TAKE GAS DETECTION METER FOR CONFINED SPACE ENTRY.
TAKE TAPE MEASURE, RAGS,
FOLLOW CONFINED SPACE ENRTY PROCEEDURES
CHECK POSITIONS OF FLOATS.
LOW LEVEL 48" IN TO FLOOR (117 on 12/15/98)
HIGH LEVEL 26" IN TO FLOOR (80 on 12/15/98)
HIGH OIL LEVEL 10" IN TO FLOOR
CHECK TO BE SURE BOTH PUMPS ARE WORKING
CHECK TO BE SURE THE RED LIGHT COMES ON FOR HIGH LEVEL IN THE POWER HOUSE AND ON THE CONTROL POST. Not coming on! Bulb not burning!
RESET THE THE CONTROL POST LIGHT. THIS WILL REQUIRE REMOVING THE COVER.
CHECK THE OIL LEVEL IN THE NORTH TANK AND RECORD 13" IN TO FLOOR (90 on 12/15/98)


LS3 HIGH WATER ALARM
LAG PUMP ON
LS2 LEAD PUMP ON
LS1 PUMPS OFF
HIGH WATER ALAR

CDF005783